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HAEMORRHAGIC PLEURAL EFFUSION IN ACUTE PANCREATITIS

STUART J. SAUNDERS, M.B., CH.B. (CAPE TOWN)

and

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The literature contains very few reports of haemorrhage remote from the pancreas in acute pancreatitis. This is probably not a true reflection of its incidence and 2 cases are recorded here drawing attention to this feature of the disease.

CASE REPORTS

Case 1

B.K., a Native female aged 53, was admitted to hospital on 20 September 1955 in a moribund state. The story was difficult to elicit but apparently she had complained of intermittent attacks of abdominal pain during the past 4 months. The pain was in the epigastrium and radiated to the hypochondrium on the left and to the back between the shoulder blades. During the 2 days before admission to hospital the abdominal pain was severe and persistent and she would not take any food.

On admission the patient looked very ill. She was apathetic and disorientated; marked general weakness and hypotonia. Evidence of severe peripheral circulatory collapse—cold, clammy extremities, profuse sweating, only the femoral pulses palpable, pulse 120 beats per minute and the blood pressure unrecordable. She was cyanosed. No clinical jaundice. No evidence of congestive cardiac failure. Generalized abdominal tenderness was observed, more marked in the epigastrium. There was slight guarding of the left upper abdominal wall and the physical signs of a left basal pleural effusion were elicited; a chest X-ray confirmed this finding and on aspiration of the left chest heavily blood-stained fluid was withdrawn. The patient died before further investigation or treatment could be instituted. The provisional clinical diagnosis was pulmonary infarction.

Autopsy was performed 24 hours after death. The findings were: Acute haemorrhagic pancreatitis with complete necrosis of the pancreas and extensive haemorrhage into it. Necrosis of the peripancreatic retroperitoneal fat and of the fat of the mesentery of the small intestine and transverse mesocolon. Serosanguinous ascites was present. The muscle of the diaphragm was normal but there was a fibrinous exudate on the peritoneal surface of the left vault. The left pleural cavity contained a heavily blood-stained effusion measuring approximately 3 pints. There was no pulmonary infarction or thrombosis of the pulmonary vessels, and the left lung, which was compressed against the hilum, was otherwise normal. There was a slight excess of lightly blood-stained fluid in the pericardial sac. A chronic cholecystitis was observed. There were multiple faceted mixed gall-stones in the gall-

bladder and several similar stones in the common bile-duct which was dilated to a diameter of 1 cm. The splenic vein contained a recent ante-mortem thrombus except at its two extremities and there was diffuse fatty change in the liver but no evidence of cirrhosis. Histologically the pancreatic and fat necrosis were confirmed. There was slight periductal and periacinar fibrosis.

Case 2

V.B., European male aged 46, was admitted to hospital on 16 March 1956. He had been a heavy drinker for the last 10 years. He had suffered from attacks of upper abdominal pain, which were always precipitated by alcoholic bouts, the attack of pain lasting 1 day. Following such an episode at the end of February he experienced a pleuritic pain in the left lower chest anteriorly and this was associated with pyrexia. The chest pain lasted for 5 days and recurred early in March, when it was associated with a non-productive cough. He had been tired and listless during that time.

On admission to hospital an ill-defined cystic mass was palpable in the left upper quadrant of the abdomen. This mass moved moderately well on respiration. There was stony dullness at the left base and in the left axilla. In this area there was diminished air-entry and a friction rub was audible. The blood pressure was 150/110 mm. Hg, but there was no other evidence of cardiovascular disease. Approximately 1 pint of dark, uniformly blood-stained fluid was aspirated from the left chest. This fluid was centrifuged in a Wintrobe tube and the red deposit constituted 35% of the total. Unfortunately there is no record of the character of the supernatant fluid. The protein content of the aspirate was 4.5 g.%, and no tubercle bacilli were seen in smears of it. There was a mixed growth of salivary organisms and non-pathogenic yeasts from a fresh sputum specimen and no tubercle bacilli were seen in a 24-hour specimen. Serum albumen was 4.0 g.%, serum globulin 2.5 g.%, Serum amylase 40+ units and 20 units per c.c. on different occasions (normal 10 units per c.c.). 24-hour urinary diastase 128,000 units, 167,000 units and 292,000 units on different occasions (normal 30,000 units). The glucose tolerance test showed a diabetic curve: Fasting blood-sugar 137 mg.%; 1 hour after ingestion of 50 g. of glucose, 275 mg.%; 1 hour 207 mg.%; 2 hours 163 mg.%. Blood urea 17 mg.%, and serum calcium 8.9 mg.%. Electrocardiograph was within normal limits. The sedimentation rate was 90 mm. in the first hour (Westergren). Blood count: Haemoglobin 10.9 g.%, packed-red-cell volume 37%, white blood-cells 5,600 per c.mm., peripheral blood-smear normal. The urine contained a trace of glucose. Straight X-ray of the abdomen showed diffuse pancreatic calcification and

barium meal revealed displacement of the stomach with distortion of its contour by a mass in the lesser sac.

COMMENT

Haemorrhage into the pancreas and structures in close proximity to it is an essential feature of the haemorrhagic variety of the disease. It is thought to be due to the local effects of the proteolytic digestion of blood vessels. Haemorrhage into areas remote from the pancreas may be caused by one of two different mechanisms—the tracking of the proteolytic enzymes to beyond the peritoneal cavity, or a general bleeding tendency. A few cases of such remote haemorrhage have been described in the literature. Beck¹ recorded one case with a right-sided haemothorax and scattered haemorrhages in the lung together with a small haemopericardium. Smith,² Werner³ and Anglem and Lee,⁴ each recorded an example of haemothorax in acute pancreatitis. In 2 of these the side was recorded, the one the right and the other the left. Petechiae on the buttocks have been noted.⁵ Renal haemorrhage and haemorrhage into the skin of the abdominal wall is also scantily recorded.^{6,7}

While the authenticity of the first case is clear, the diagnosis of haemorrhagic pleural effusion in the second is a clinical one and possibly open to other interpretation. The fluid withdrawn might have come from the cyst or mass below the diaphragm, and the radiological appearances might have been due to an elevated left dome. While this possibility cannot be completely excluded we feel that the patient most likely had a left-sided haemothorax. This effusion may have been formed during an acute flare-up of chronic pancreatitis.

The blood in the pleural sacs of these two patients could have been the result of either of the two postulated mechanisms. If one invokes the local effects of enzymes then they would have to gain access through the natural openings of the diaphragm. In the absence of any other effects of these enzymes in the pleural cavity of the first patient it seems likely that the bleeding may have resulted from a general bleeding tendency. Innerfield *et al.*^{8,9} showed in rabbits and in dogs that the

intravenous administration of trypsin prolonged the bleeding and coagulation times, caused a fall in prothrombin, Ac-globulin, antifibrinolysin, fibrinogen, and antithrombin. The fall in the plasma level of the last is transient and there is a secondary sustained rise of antithrombin. They also showed that there was a parallel between the plasma antithrombin and trypsin levels. The initial drop in antithrombin may increase the tendency to thrombosis temporarily, followed later by a bleeding state. It seems likely that the general bleeding state is induced by the liberation of activated trypsin into the systemic circulation.

Case 1 demonstrates that acute pancreatitis must be considered in shocked states associated with haemorrhagic pleural effusions. Pulmonary infarction is a much commoner cause of such a clinical picture, and abdominal pain occurring in the latter may further complicate the issue.

SUMMARY

1. Two cases with haemorrhage into the left pleural sac in acute pancreatitis are recorded.
2. Pancreatitis should be considered in the differential diagnosis of haemothorax.
3. Possible mechanisms are discussed.

We should like to thank Dr. N. H. G. Cloete, Superintendent of Groote Schuur Hospital; Professor J. F. Brock, Head of the Department of Medicine; Professor J. G. Thomson, Head of the Department of Pathology; and Professor F. Forman and Dr. L. Mirvish, under whose care the patients were, for permission to publish these case reports.

REFERENCES

1. Beck, D. (1937-38): J. Mt. Sinai Hosp., 4, 895.
2. Smith, E. B. (1953): Arch. Surg., 67, 52.
3. Werner, H. Quoted by Smith, E. B.²
4. Anglem, T. J. and Lee, W. F. (1949): Arch. Surg., 53, 484.
5. Davis, C. (1941): Med. J. Austral., 2, 743.
6. Coffey, R. J. (1952): Ann. Surg., 135, 715.
7. Bockus, H. L. and Raffensburg, E. C. (1948): N.Y. St. J. Med., 48, 2252.
8. Innerfield, I., Schwartz, A. W. and Angrist, A. (1952): Bull. N.Y. Acad. Med., 28, 537.
9. Innerfield, I., Angrist, A. and Benjamin, J. W. (1951): Gastroenterology, 19, 843.

BOOKS RECEIVED : BOEKE ONTVANG

- Studies in Toxopneumology.* Edited by Nolan D. C. Lewis, M.D., Carney Landis, Ph.D., D.Sc. and H. E. King, Ph.D. Pp. viii + 248. \$6.75. New York and London: Grune & Stratton, Inc. 1956.
- Psychopathy and Delinquency.* By William McCord, Ph.D. and Joan McCord, Ed.M. Pp. x + 230. \$6.50. New York and London: Grune & Stratton, Inc. 1956.
- J.A.M.A. Clinical Abstracts of Diagnosis and Treatment.* Published with the Approval of the Board of Trustees, American Medical Association. Pp. vii + 661. \$5.50. New York and London: Intercontinental Medical Book Corporation with Grune & Stratton, Inc. 1956.
- Selected Papers of Sir Gordon Holmes.* Compiled and Edited by F. M. R. Walshe. Pp. xii + 264. Illustrations. 20s. net. London: Macmillan & Co. Ltd. 1956.
- Landmarks in the History of Hygiene.* By Henry E. Sigerist, M.D., D.Litt., LL.D., D.Sc., F.R.C.P. Pp. ix + 78. 4 Illustrations. 12s. 6d. London, New York and Toronto: Oxford University Press. 1956.

- Tredgold's Text-book of Mental Deficiency.* Ninth Edition. By R. F. Tredgold, M.D., D.P.M. and K. Soddy, M.D., D.P.M. Pp. xv + 480. 31 Plates. 4 Figures. 4 Tables. 40s. net. London: Baillière, Tindall and Cox Ltd. 1956.
- Internal Medicine. A Physiologic and Clinical Approach to Disease.* By Robert P. McCombs, B.S., M.D., F.A.C.P. Pp. xxi + 706. 49 Figures. \$10.00. Chicago: Year Book Publishers, Inc. 1956.
- Year Book of Medicine—1956-1957 Series.* Edited by Paul B. Beeson, M.D., Carl Muschenheim, M.D., William B. Castle, M.D., Tinsley R. Harrison, M.D., Franz J. Ingelfinger, M.D. and Philip K. Bondy, M.D. Pp. 744. 118 Figures. \$6.75. Chicago: Year Book Publishers, Inc. 1956.
- Anaesthetic Accidents.* By V. Keating, M.B., B.Ch., D.A., F.F.A.R.C.S. Pp. vii + 261. 13 Figures. South African Price £1 11s. 6d. London: Lloyd-Luke (Medical Books) Ltd. 1956. (Sole Distributors for Southern Africa: P. B. Mayer, P.O. Box 713, Cape Town.)

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South African Medical Journal

VAN DIE REDAKSIE

BEHANDELING VAN PATOLOGIESE BREUKE

Die aanvanklike doel van die behandeling van beserings by bejaarde mense is amper altyd om die pasiënt so gou moontlik weer op die been te bring; die bejaarde kan nie lang periodes van immobilisasie uitstaan sonder ernstige verlies van fisiese- en geesteskrag nie. Om hierdie rede mag tegniese volmaaktheid van metode of behandeling—so belangrik by 'n jong pasiënt—dikwels hiervoor opgeoffer word, veral as die uiteindelijke doel versagting van die ongemaklike kliniese eienskappe, eerder as 'n permanente kuur is. 'n Tipiese voorbeeld van hierdie tipe geval vind ons by die bejaarde en verswakte lyer aan 'n kwaadaardige siekte wat 'n patologiese breuk weens metastases in been opdoen. 'n Lang en dikwels pynlike periode van immobilisasie mag op hierdie katastrofe voeg wat, wanneer daarop teruggekyk word, in baie instances as die begin van die einde bestempel kon word.

Die doel van behandeling is dus om die pasiënt vroeg en pynloos ambulant te maak, en die betreklik swak vooruitsig by pasiënte met kwaadaardige verspreidings, regverdig die gebruik van vrymoediger metodes om hierdie doel te behaal. Vir 'n tyd is die aanwending van uitstraling op die metastases—as 'n terapeutiese sambreel om die gevaar van verspreidende kwaadaardige selle te beperk—aanbeveel, voor daar werklik geopereer word, indien ope reduksie wel nodig sou wees. Onlangs egter het Jelliffe,¹ toe hy die sienswyse bevestig het dat radioterapie 'n rol by die behandeling van die toestand behoort te speel, verklaar dat meganiese reduksie en fiksering van die breuk, voorkeur bô die metode moet kry. Nie alleen verminder uitstel die kanse van 'n bevredigende meganiese resultaat nie—so skryf hy—maar die teoretiese gevaar van verspreidende kwaadaardige selle, as daar voor uitstraling geopereer word, is nie werklik so 'n lewensbelangrike oorweging by hierdie tipe geval as wat dit byvoorbeeld by 'n primêre borskarsinoom is nie. Dit is verreweg belangriker om die pasiënt weer op die been te kry.

Om hierdie rede het Jelliffe en sy chirurgiese kollegas, Devas en Dickson begin om hulle patologiese breukgevalle met onmiddellike inwendige fiksering te behandel en dit so gou moontlik met uitstraling op te volg. Meer as 15 jaar gelede het Küntscher² op die aansienlike voordele van hierdie metode gewys, nl. vryheid van pyn, 'n mate van beweeglikheid terwyl die pasiënt nog in die bed is, makliker verpleging (selfs tuis), 'n spoediger herstel en, boonop, groter

EDITORIAL

TREATMENT OF PATHOLOGICAL FRACTURES

The primary aim in the treatment of injuries in old people is nearly always to get the patient back on his feet as soon as possible; the aged cannot bear long periods of immobilization without serious loss of physical and mental vigour. For this reason, technical perfection of technique or treatment—so important in a young patient—may frequently be sacrificed to this end, particularly as the long-term aim is palliation of the discomforting clinical features rather than permanent cure. A typical example of this type of case is the aged and weakened sufferer from malignant disease who sustains a pathological fracture through metastases in bone. A long and often painful period of immobilization may follow this catastrophe, which, retrospectively, in many instances can be designated the beginning of the end.

The aim of treatment, then, is early painless ambulation, and the relatively poor prognosis in patients with disseminated malignancy justifies the use of bolder techniques to achieve it. For some time the application of radiation to the metastases—as a therapeutic umbrella to limit the risk of disseminating malignant cells—has been advised before actual operation, if open reduction is indeed required. Recently, however, Jelliffe¹ in affirming the view that radiotherapy should play a role in the treatment of the condition, stated that mechanical reduction and fixation of the fracture should take priority over it. Not only does delay diminish the chance of a satisfactory mechanical result, he wrote, but the theoretical danger of disseminating malignant cells by operating before irradiation is not really so vital a consideration in this type of case as it is with, say, a primary breast carcinoma. It is far more important to get the patient back on his feet.

For this reason, Jelliffe and his surgical colleagues, Devas and Dickson, have commenced treating their cases of pathological fracture by immediate internal fixation followed as soon as possible by irradiation. Küntscher² more than 15 years ago pointed out the considerable advantages of this method, viz. freedom from pain, a degree of mobility whilst still in bed,

toegang vir die aanwendings van X-strale aan meer as een gebied, wat nodig mag wees vir 'n taamlik weerstandsbiedende gewas. Die metodes is identies met dié wat gebruik word om nie-patologiese breuke deur die inwendige metode te fikseer.

Daar is baie tegniese moeilikhede en Jelliffe en sy medewerkers verklaar dat, as 'n algemene reël, dit waarskynlik beter is as inwendige fiksering vermy word, tensy die pasiënt se ouderdom, algemene toestand en omstandighede suggereer dat langdurige immobilisasie ongewens is, en die gebruik daarvan by gevalle van 'n patologiese breuk van die pypbeen by 'n bejaarde en swak persoon met wydverspreide kwaadaardige siektes, word as 'n keuse gelaat. Pyn is 'n oorweging van groot belang, immobiliteit 'n ander, en die gevolgtrekking dat uitwendige fiksering nie daarin sal slaag om die pasiënt gou ambulante te maak of bevredigend te genees nie. Daar behoort een of ander bewys van die metastatiese aard van die gewas aanwesig te wees voordat inwendige fiksering oorweeg word. 'n Ander definitiewe aanduiding is die aanwesigheid van 'n hormoonafhanklike gewas waarvan die wydverspreide neerslae terapieus beheer kan word. By ten minste een van die pasiënte in Jelliffe *et al.* se reeks, was oormatige pyn die enigste aanduiding vir 'n operasie.

Met die oog op die sukses van inwendige fiksering by behandeling van breuke van die dybeenskag, is dit nie verbasend dat die meerderheid van hulle gevalle van hierdie tipe was nie. Van die 7 gevalle wat op hierdie wyse gestabiliseer was, het ten minste 3 daarvan genees (volgens radiologiese bewys) en almal was ambulante. Tussenknobbelbreuke en breuke van die laer nek van die dybeen was met 'n Smith-Petersen pen of met 'n spyker en plaat behandel; 6 kwaadaardige letsels was suksesvol deur hierdie metode gestabiliseer.

Die derde tipe van patologiese breuk, was dié wat die skag van die boarmbeen aantast, waar ondraaglike pyn en ongemak die enigste aanduiding vir 'n operasie was; hier was 3 pasiënte, slegs deur vermindering van pyn alleen, in staat om 'n aktiewe lewe te hervat.

Ten slotte moet daarop gewys word dat inwendige fiksering as 'n voorbehoedmiddel, 'n definitiewe plek inneem by behandeling van enige geval waar dit skyn of 'n patologiese breuk dreig. Dit is 'n belangrike punt, aangesien die gevaar van 'n breuk vir 'n periode na diep X-straaltherapie en voordat kalsifikasie en genesing begin, opvallend toeneem.

1. Devas, M. B., Dickson, J. W. en Jelliffe, A. M. (1956): *Lancet*, 2, 484.
2. Küntscher, G. (1940): *Klin. Wschr.*, 67, 1145.

easier nursing (even at home), and more speedy convalescence; and, in addition, greater access for the multiple-field applications of X-rays that may be required for a fairly radio-resistant tumor. The techniques are identical with those used in fixing non-pathological fractures by the internal method.

There are many technical difficulties, and Jelliffe and his co-workers state that, as a general rule, internal fixation is 'probably best avoided unless the age, general condition, and circumstances of the patient suggest that prolonged immobilization is inadvisable', which leaves it as a procedure of choice for pathological fracture of a long bone in an old and frail person with widespread malignant disease. Pain is a primary consideration, immobility another, and the conclusion that external fixation will fail to ensure early ambulation or satisfactory healing. Some evidence of the metastatic nature of the growth should be present before internal fixation is considered. Another definite indication is the presence of a hormone-dependent growth whose widespread deposits can be therapeutically controlled. In at least one of the patients in the series of Jelliffe *et al.* excessive pain was the sole indication for operation.

In view of the success of internal fixation in treating fractures of the shaft of the femur, it is not surprising that the majority of their cases were of this type. Of the 7 cases thus stabilized, at least 3 healed (according to radiological evidence) and all were ambulant. Inter-trochanteric fractures and fractures of the lower neck of the femur were treated with a Smith-Petersen pin or with a nail and plate; 6 malignant lesions were successfully stabilized by this method.

The third type of pathological fracture was that affecting the humeral shaft, where unbearable pain and discomfort was the ruling indication for operation; here 3 patients were able to resume an active life by reduction of pain alone.

Finally it is pointed out that prophylactic internal fixation has a definite place in treatment in any case where a pathological fracture seems imminent. This is an important point, since the risk of fracture increases markedly for a time after deep X-ray therapy before calcification and healing commence.

1. Devas, M. B., Dickson, J. W. and Jelliffe, A. M. (1956): *Lancet*, 2, 484.
2. Küntscher, G. (1940): *Klin. Wschr.*, 67, 1145.

UNION DEPARTMENT OF HEALTH BULLETIN

Union Department of Health Bulletin. Report for the 7 days ended 18 October 1956.

Plague, Smallpox: Nil.

Typhus Fever: Three (3) Native cases in the Cradock native location. Diagnosis based on clinical grounds only. The result of the laboratory test of one (1) Native case of Typhus Fever in the Cradock District reported in Bulletin No. 39 of 1956, proved negative.

Epidemic Diseases in Other Countries:

Plague: Nil.

Cholera in Calcutta (India); Chittagong (Pakistan).

Smallpox in Rangoon (Burma); Bombay, Calcutta, Cuddalore, Madras, Pondicherry, Tuticorin, Visakhapatnam (India); Dacca (Pakistan); Nairobi (Kenya).

Typhus Fever in Baghdad (Iraq).

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A DISCUSSION ON 55 RESPIRATOR CASES IN THE RECENT POLIOMYELITIS EPIDEMIC OF 1956*

LOUIS KAPLAN, M.B., B.CH. (RAND)

Full-Time Assistant Physician, Boksburg-Benoni Hospital

Before 1955-56 an average of 30 poliomyelitis cases per year, 4 to 5 of which were non-European, were treated at the Boksburg-Benoni Isolation Hospital. An average of 2 patients per year (6.7%) received treatment in tank respirators. For the year ended 30 June 1956 370 poliomyelitis cases were admitted, 161 of which were non-European. Of these, 55 cases (15%)—36 European and 19 non-European—developed respiratory difficulty to a life-threatening extent necessitating artificial respiration in a respirator.

The non-European cases were mostly (about 90%) Bantu. The 19 non-European respirator cases consisted of 16 Bantu, 1 Coloured (by repute), and 2 Indians.

It is this group of 55 respirator cases that has been chosen for discussion. The fatalities that occurred, and the most crippling associated paralysis, arose from this group. It presented a challenging therapeutic problem.

Types of Respirators used

1. *The Tank Respirator—Drager.* This is the modern 'iron lung' and was the type used almost exclusively in this group of respirator cases. Ten such respirators were made available and they were all in action at the same time during May 1956. A number of improvements are incorporated. The 'dome' arrangement, as seen in Fig. 1, administers effective artificial respiration from above, thus allowing the patient to receive the necessary nursing attention without causing any respiratory distress. The new-type diaphragm fitting is positioned around the upper chest, and not around the upper neck region as in the old respirators. Not only is this more comfortable for the patient but it permits of tracheotomy being performed, if necessary, with the patient remaining in the respirator. Moreover, there is no longer the danger of interference with cardiac output that may result from strong negative pressure on the veins of the neck which, occurring during inspiration, tends to reduce the venous return to the heart. The respiratory rate and pressures are easily adjustable. An alarm bell is immediately set off should the pressure fall and there are various levers, supports and portholes to allow for positioning and efficient nursing of the patient.

2. *The Drinker Type ('Voortrekker').* This is the old-type tank respirator and is the machine that has been used in the past at the Boksburg-Benoni Hospital. The respiratory rate was most difficult to adjust and the pressures not always constant and easily regulated. An engineer was always on call. Bedsores and chafing, especially around the neck, were always a danger. This respirator was used in the present series only

temporarily in the early stages of the epidemic, while the arrival of further 'Drager' respirators was awaited.

3. *The Kifa Respirator.* This apparatus applies pressure directly by means of a diaphragm positioned over abdomen and chest. It was used in a few cases, to assist in the weaning of the patient from the tank respirator. It could not replace the tank respirator in effectiveness where real respiratory difficulty existed.

4. *The Poliomat (Drager).* The Poliomat, supplying intermittent positive-pressure ventilation through a tracheostome was used in only 3 cases. (For description see below.)

Indications for use of Respiratory Therapy

Simple clinical tests were employed to determine whether a patient required a respirator. The duration of phonation, the voice volume and the length of time a patient could hold his breath were all useful indices of pulmonary reserve. The ability to cough was a very good index of function of the diaphragmatic, intercostal and abdominal muscles, as well as of the laryngeal muscles. When a patient showed signs of

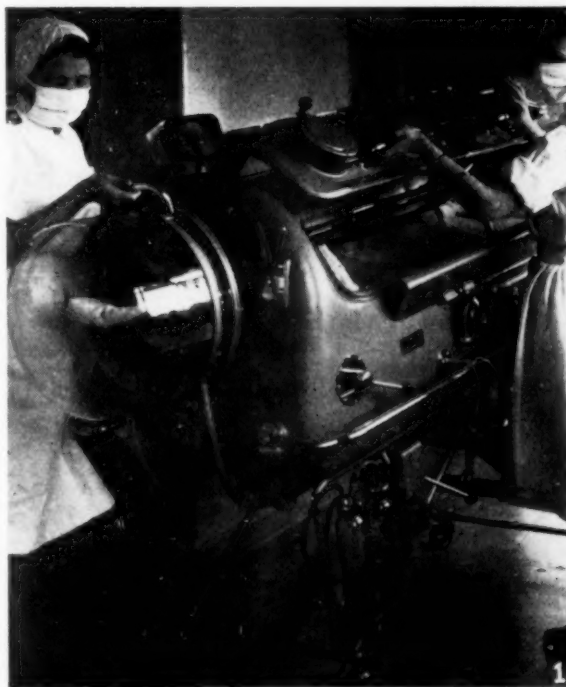


Fig. 1. The modern tank respirator (Drager) with the dome being placed in position.

* The subject of an address to the East Rand Branch of the Medical Association of South Africa on 28 June 1956.

air hunger, used accessory muscles of respiration, or developed any impairment of movement of the diaphragm, he was considered to be a definite candidate for respirator therapy. Where diaphragmatic paralysis existed, even if only partial, there was certain to be associated intercostal paralysis. A jerky movement of the diaphragm was yet another useful index of respiratory difficulty.

Rib recession of the lower 6 ribs caused by the pull of the diaphragm on weakened intercostals was yet another sign observed. This often produced a paradoxical or alternating type of respiration between the upper and lower chest, and was also frequently associated with suprasternal recession.

Cyanosis in varying degrees was noted. Obvious cyanosis was a late sign and indicated urgent admission to a respirator as well as immediate clearing of the air passages.

Other signs such as flushing of the face and marked restlessness and anxiety marked the onset of severe poliomyelitis leading to respiratory distress and indicated admission to a respirator.

Carbon-dioxide estimations of expired air (tidal) as well as of venous blood were of no value as indices for respirator therapy (see below).

Management

Before the patient was placed in the tank respirator, if he was old enough he was given to understand that his breathing was to be assisted in a special type of bed. The term 'iron lung' is best avoided. The word 'poliomyelitis' was also avoided in our wards by both doctors and nurses. In the imaginative patient this word might possibly produce fear and visions of crippling deformities. The term 'special virus' was used instead.

At the same time a sedative, usually phenobarbitone, was administered and repeated frequently in the anxious patient. Not only was the patient sedated but more often than not the parents, too, had to be given sedation. Whenever possible, a description of what was about to happen was given to the parents, who were then allowed to remain with the patient. This arrangement generally proved satisfactory. It placed the little patient in a happier frame of mind and at the same time the parent, after a short while, became quite useful in assisting the nursing staff with feeds, washing, etc.

With the patient in the respirator, the intra-tank pressure and respiratory rate was immediately regulated. The following tank pressures were usually maintained:

Infant ..	..	..	..	minus 8 to plus 4.
Child ..	..	..	..	minus 10 to plus 5.
Adolescent ..	..	..	..	minus 12 to plus 5.
Adult ..	..	..	..	minus 12-18 to plus 5.

Carbon-dioxide estimations on the expired air sometimes indicated hyperventilation. The pressure was then regulated accordingly. No case of tetany, due to hyperventilation, was ever observed. Hypoventilation, however, was seldom diagnosed by means of such analysis of expired air (see below).

The respiratory rate of the machine was as far as possible adjusted to coincide with that of the patient. Readjustments were made from time to time as the

ventilation of the patient improved. In hypoventilated patients the respiration rate was not increased and the more effective measure was adopted of increasing the negative pressure.

The importance of postural drainage can hardly be exaggerated. The respirator was therefore always placed in the Trendelenberg position, one as steep as about 30° being employed when the secretions tended to accumulate. Vomiting and inhalation of gastric content was a well-recognized danger, against which the steep Trendelenberg position, together with timely suction, was a safeguard. In this position the vomit or secretions accumulated further away from the vocal cords and towards the upper part of the pharynx, where they could be more easily and safely suctioned off. Side levers were also utilized for the moderate tilting of the patient to one or other side. More effective postural drainage could have been produced by using the prone or semi-prone positions but, unfortunately, these positions, could not be obtained with the tank respirator. The Trendelenberg position also served to improve the cardiac output in the paralysed patient (Berneus *et al.*¹).

The necessity of having a trained nurse constantly at the bedside for every patient was recognized at the outset. Her task was constant vigilance, observing any incipient complications, and calling medical aid in time. Once she had gained the confidence of her patient, efficient and gentle intermittent suction of secretions could be carried out without undue distress. The patient's position was frequently changed to prevent congestion of the lungs. At the same time it was found to be most important to avoid the dangerous fatigue which might be precipitated by too much attention. It was not unusual for the nurse to report her own observation that a particular respirator-patient seemed better off if not overtaxed with too much attention.

Treatment was symptomatic and prophylactic. It consisted of aspirin or even pethidine for pain, phenobarbitone and sometimes Largactil for agitation or restlessness, and gentle positioning of the paralysed and tender limbs. Splinting of limbs was not employed. Where any impairment of swallowing or gastric distension existed a stomach tube was immediately introduced. Having reduced gastric distension the tube was then used for feeding. Normal fluid and electrolyte balance was maintained. Oxygen was administered nasally. Laryngoscopy, with deep catheter suction when necessary was frequently performed. Bronchoscopy, and tracheotomy with or without the application of the Poliomat, were resorted to when necessary, not as routine procedures (see below). X-rays of the chest were taken whenever atelectasis or pulmonary infection was suspected. Electrocardiograms were recorded to determine possible cardiac complications (see below). At first retention of urine was treated by catheterization; later, Carbachol was used successfully. With careful nursing, bed sores were never a problem. Antibiotics were administered to all respirator patients.

A lumbar puncture was generally performed as a routine procedure. When, however, the patient urgently required admission to the respirator, this procedure was at times postponed or waived altogether.

The need for psychological support became greater as the length of stay in the respirator increased. Attention was particularly directed to the maintenance of good morale. Information about poor prognosis was always withheld and constant encouragement was given.

Physiotherapy was initially confined to coaching the patient in breathing with the respirator. Selective chest exercises and massage were given as soon as the temperature and muscle tenderness had subsided. Associated limb paralysis was also given early physiotherapy while the patient was still in the respirator.

Weaning was best achieved by switching off the respirator for gradually increasing periods each day. This method was found to be superior to using the 'Kifa' apparatus. A patient tiring after a period needed the immediate ventilation and rest which the tank respirator supplied.

Methods and Materials

All this series of 55 poliomyelitis cases were treated during the period of 6 months from 1 January to 30 June 1956, no patients requiring respirator therapy in the latter half of 1955.

The modern Drager tank respirator was used in all these cases. The Poliomat was resorted to in 3 of them and the Kifa and the old-type Drinker respirators were used temporarily in a few cases.

CLINICAL FEATURES

Age Incidence

It will be seen from Table I that most cases belonged to the 1-6 year age-group, both in Europeans and non-Europeans. The incidence in the younger age-groups was proportionately higher in non-Europeans,

TABLE I. POLIOMYELITIS RESPIRATOR CASES, BY AGE AND RACE

Age-group	Non-European		Total
	European	Non-European	
0-3 months	0	0	0
3-6 months	1	2	3
6 months to 1 year	1	2	3
1-6 years	18	11	29
6-10 years	7	2	9
10-20 years	6	1	7
20-30 years	1	0	1
30-40 years	1	1	2
Over 40 years	1	0	1
Total	36	19	55

79% of non-European respirator cases, and 55% of European, occurring under 6 years of age. It seemed that a very early immunity was no longer being attained among the non-Europeans.

Sex Incidence

The ratio shows the usual male preponderance in poliomyelitis (Table II). Over the age of 25 years there

TABLE II. POLIOMYELITIS RESPIRATOR CASES, BY SEX

	Non-European		Total
	European	Non-European	
Male	22	12	34
Female	14	7	21

were 2 European females (26 years and 47 years), 1 European male (31 years), and 1 non-European male

(33 years). It is reported that females are more susceptible to poliomyelitis over the age of 25 years; both females in this age-group were particularly severely paralysed and died soon after admission.

Siblings

Of the total of 18 patients in the 9 families who had more than one child admitted with proved poliomyelitis, 7 patients were treated in respirators. Two of these families both had their only 2 children treated as severe respirator cases. Three other families with more than one case each had single members treated in respirators. The impression gained was that the infection was severer amongst siblings contracting poliomyelitis, a high percentage requiring respirator therapy.

Hair Colour

Of 36 European respirator patients, 30 were definitely blonde. This possibly indicates a higher susceptibility in the fair-haired to severe poliomyelitis with respiratory paralysis. Lea² could show no complexion relationship in an extensive survey carried out in the British Isles; no particular reference, however, was made to respirator cases.

Seasonal Incidence

An interesting feature of this epidemic has been its late seasonal incidence, most cases occurring in the autumn and winter months of April, May and June, 1956. Table III (A) indicates that most of the respirator

TABLE III (A). POLIOMYELITIS (TOTAL) AND POLIOMYELITIS (RESPIRATOR) CASES: MONTHLY INCIDENCE DURING YEAR ENDED 30 JUNE 1956

		<i>Poliomyelitis</i> (Total) *	<i>Poliomyelitis (Respirator)</i> non- <i>European</i> <i>European</i>		<i>Total</i>
1955					
July .. ..	..	0	0	0	0
August .. ..	..	0	0	0	0
September .. ..	..	1	0	0	0
October .. ..	..	3	0	0	0
November .. ..	..	2	0	0	0
December .. ..	..	1	0	0	0
1956					
January .. ..	..	10	2	0	2
February .. ..	..	11	1	0	1
March .. ..	..	72	4	0	4
April .. ..	..	132	9	7	16
May .. ..	..	99	14	10	24
June .. ..	..	39	6	2	8
Total		370	36	19	55

* All races, corrected for wrong diagnosis and excluding possible abortive cases. The total cases admitted under the diagnosis of poliomyelitis numbered 425.

cases occurred in May 1956, and that the first of the non-European respirator cases followed 3 months after the first European case. It has been demonstrated by Gear³ that poliomyelitis is truly seasonal in its incidence, the virus being present in large numbers during epidemic, but not so during inter-epidemic periods. Also a relationship between rainy seasons and poliomyelitis epidemics in South Africa has been queried.

Table III (B) indicates a comparatively high rainfall

occurring in 1956 as late as March. This was followed by the dry, yet comparatively warm, month of April,

TABLE III (B). AVERAGE RAINFALL R (INCHES) AND LOWEST TEMPERATURE T (°C) RECORDED IN THE 3 AUTUMN MONTHS FOR THE PAST 3 YEARS

	1956		1955		1954	
	R	T	R	T	R	T
March	5.26	+7.5	2.03	+0.2	3.07	+3.5
April	0	+3.3	3.10	+0.4	2.07	+0.5
May	2.52	-3.2	3.06	+1.5	1.30	-3.0

in which the peak incidence for poliomyelitis occurred. The peak incidence for respirator cases, however, occurred still later, in May 1956, when winter conditions prevailed and some rainfall occurred. Thus there were in April 1956 16 respirator cases out of 132 poliomyelitis cases admitted, and in May 1956 24 respirator cases out of 99 poliomyelitis cases admitted.

The indications are that the late seasonal incidence of the epidemic as a whole, and the respirator cases in particular, was related to the late and comparatively heavy rainfall, as well as to the late onset of winter climatic conditions.

Predisposing and Aggravating Factors

1. *Exercise and Fatigue.* Three European patients gave definite histories of having participated in strenuous games of rugby a few days before the development of symptoms. All 3 needed urgent mechanical respiratory assistance. One case (aged 20 years) died about 12 hours after admission. The 2nd (aged 18 years) is at present being weaned from a tank respirator and, after two weeks, still has fairly severe paralysis of the arms, legs and abdominal muscles and weakness of the intercostal muscles and diaphragm. The 3rd (aged 14 years) still has complete intercostal and diaphragmatic paralysis and is now, one month later, completely unable to remain without artificial respiration. It appears from the above that strenuous sport is an important aggravating factor in poliomyelitis. It was also noted that many of the severest cases, requiring urgent therapy in a respirator, had been brought long distances for admission. The fatigue thus produced seemed to be an aggravating factor.

2. *Long-Distance Travel.* A patient with respiratory paralysis, travelling over a long distance to reach hospital, was always in danger of inhaling vomitus or secretions. A number of such patients on arrival, were suspected of having inhaled vomitus, by the 'wet' state of their lungs combined with a history of having vomited. Even a small amount of acid content from the stomach, if inhaled, would severely handicap the patients further progress.

3. *Tonsillectomy.* One case (aged 3½ years) was subjected to tonsillectomy 2 weeks before admission. She developed bronchopneumonia despite intensive antibiotic therapy and early admission to a tank respirator, in which she remained for 32 days and then died. Although the muscles of respiration recovered to a large extent, X-ray revealed patchy consolidation of both lung fields 11 days after admission. This child remained persistently cyanotic and seemed to have no resistance whatsoever. This was the only case to be

admitted with a history of tonsillectomy before admission.

4. *Injections.* Very few significant histories of previous injections or inoculations were obtained. There were, however, 2 minor paralytic cases where the paralysis followed diphtheria immunization, the paralysis occurring in the muscle into which the injection was made.

5. *Chicken-Pox.* Two cases (6 years and 8 years) were admitted with obvious signs of chicken-pox—one still had vesicles and the other presented with crusted lesions. They were both severely affected poliomyelitis cases and required the tank respirator for periods of 11 and 8 days. Now, almost 2 months later, they are still bedridden, with generalized paralysis and inability to cough. A previous history of chicken-pox was given in two other respirator cases but not recent.

6. *Infectious Hepatitis.* One case (aged 8 years) had a history of infectious hepatitis 6 months before admission. This previous virus infection evidently conferred no protective value. The child developed polio-encephalitis with marked generalized paralysis as well as terminal respiratory paralysis, and death occurred within 2 days of admission.

7. *Pregnancy.* Although increased susceptibility to poliomyelitis was noted amongst pregnant women (3 of the 6 adults with proved poliomyelitis were pregnant), the paralysis in each case was of a minor nature, none requiring a respirator or even an extended stay in hospital (Siegel and Greenberg⁴). All 3 cases were in the second trimester—a common finding as indicated by Weinstein and Meade.⁵

8. *Poliomyelitis Vaccination.* No respirator case had received previous immunization against poliomyelitis. Two patients who had been given one injection of the poliomyelitis vaccine, in the previous year, developed mild paralytic signs with abnormal cerebrospinal-fluid findings. It proved impossible to isolate the poliomyelitis virus from the stool and there was doubt whether a poliomyelitis virus was in fact responsible (Gear⁶). These were the only cases in which this was so in the total series of over 400 poliomyelitis admissions; the paresis in both cases was of very mild and transitory nature.

Symptoms and Signs

Minor Illness. A definite history of a minor illness was obtained in only 12 of the 55 respirator cases. This mostly consisted of sore throat, influenza-like symptoms or just a 'cold', and minor gastric upsets. The history was usually vague, and in some cases the symptoms lasted only a time (24-48 hours). The major illness occurred 2-14 days later.

Presenting Symptoms. By far the commonest symptoms were headache and pain at the back of the neck. Pain in the back and limbs were also common complaints. Many others complained of sore throat, vomiting, and weakness of limbs. Three of the adult patients, who required immediate artificial respiration, complained of an inability to breathe and their voices were already almost inaudible through lack of air volume.

Signs. The most significant combination of signs, indicating a rapid poliomyelitis infection with almost certain ensuing respiratory involvement, were (1) neck

rigidity, (2) flushing of the face and pyrexia, (3) extremely brisk knee and ankle jerks, and (4) apprehension and restlessness. Six of the respirator cases presented with this quartet of signs. Some of these patients were sent into our isolation hospital with a diagnosis of meningitis, presumably because of very brisk jerks. Soon, however (within 6-12 hours of admission), the brisk reflexes became completely absent, with marked paralysis ensuing and retention of urine. The patients presenting with these signs had the worst possible prognosis.

Intercostal and Diaphragmatic Paralysis. The following were the various types of respiratory paresis noted on admission:

1. Partial intercostal paralysis, symmetrical or asymmetrical, with satisfactory diaphragmatic movement.
2. Complete intercostal paralysis with satisfactory diaphragmatic movement.
3. Intercostal paralysis with predominantly unilateral diaphragmatic paralysis.
4. Intercostal paralysis with very poor or 'jerky' movement of the whole diaphragm.
5. Complete intercostal and diaphragmatic paralysis.

There were 5 cases which, very soon after admission, presented with complete intercostal and diaphragmatic paralysis (type 5). The majority of these respirator cases presented with respiratory paralysis of types 3 and 4. No case presented with diaphragmatic paralysis, even to a mild degree, without associated intercostal paralysis. In fact, any degree of diaphragmatic weakness usually meant marked, if not complete, associated intercostal paralysis.

Associated Neurological Signs. (a) *Spinal.* As was to be expected, the associated limb-paralysis was most marked in this respirator series. Most of these cases developed a weakness in all 4 limbs, the lower limbs being more frequently and more severely affected than the upper limbs. Weakness of abdominal and back muscles was also a feature of this series. The prognosis for the respirator case generally seemed better where at least some degree of limb movement was present.

(b) *Bulbar and Cranial.* Difficulty in swallowing indicating palatal and possibly some degree of constrictor pharyngeal paralysis, was obvious on admission in 14 cases (25%). With palatal paralysis alone a Ryle's tube could usually be passed nasally into the stomach. Paralysis of the constrictor pharyngeal muscles was suspected when the tube could not be passed and in these cases intravenous fluids were administered. In those that survived, these paralyses improved within a relatively short time (3-7 days usually). There were 6 cases (11%) with associated unilateral facial palsy, 4 of them associated with palatal paralysis. These associated neurological signs indicated bulbospinal poliomyelitis with its accompanying grave prognosis. There were, however, in the total series, a number of poliomyelitis cases with no paralytic signs other than facial palsy. Respiratory paralysis associated with polio-encephalitis occurred in 3 cases. These all showed signs of mental confusion, cranial-nerve palsy and twitching of the face.

'Kissing Knee' Sign and Neck Rigidity. Neck rigidity was marked in almost every case in this respirator

series. In the total series, however, where neck stiffness was sometimes a doubtful sign, the 'kissing knee' sign was invaluable. The patient with poliomyelitis invariably seemed unable to flex the head sufficiently to enable him to touch his knees with his lips. The Brudzinski and tripod signs were other useful indications of muscle weakness and spasm. Backache was always associated with neck rigidity, and was severe in some of the cases.

Muscle Tenderness. This was a common feature as well as an excellent index of the length of the acute stage. True muscle tenderness hardly ever occurred beyond the 10th day of admission. Tenderness beyond this period was, in fact, pain produced by movement of a paralysed limb whose joints had been immobile for too long. Gentle passive movements were indicated in such a case.

Temperature, on admission, ranged between 101° and 102° F, occasionally going up to 103°. The duration of the temperature averaged 3-4 days from date of admission. There were few patients with temperatures lasting up to 8 days with nothing but poliomyelitis infection to account for it. The temperature was one of the best indices of the progress of the paralysis; 24 hours after the temperature had dropped to normal one could with fair confidence predict that no further paralysis would occur. Cases have however been known to develop a late form of paralysis, but this again would be accompanied by a recurrence of pyrexia.

Pulse. A common finding was an increased pulse rate in relation to the temperature. Two cases developed bradycardia, a sign of importance and indicating myocarditis (Lawrence and Carmichael').

Blood Pressure. Vasomotor collapse with fall in blood pressure was treated by increasing the negative pressure of the tank respirator and also by increasing the degree of Trendelenberg, in an attempt to improve the venous return and cardiac output. Methedrine was also frequently used.

Cyanosis. A faint cyanotic hue was sometimes noted. This called for greater oxygenation. Deep cyanosis, due to an obstructive episode, was quickly dealt with by laryngoscopy and suction.

Mucus. Excessive mucus was a feature of the bulbospinal (wet) type of poliomyelitis. It was of great importance to assess, at the outset, the amount, viscosity and situation of the mucus present.

INVESTIGATIONS

Cerebrospinal Fluid. The usual preponderance of polymorphonuclear leucocytes in the first few days was noted. A lumbar puncture, if performed after the 5th or 6th day of illness, usually revealed a rise in lymphocytes and protein with a fall in polymorphonuclears. Still later there might be a raised protein, averaging between 50 and 100 mg. %, with possibly a small number of lymphocytes. The impression gained was that the respirator cases, if compared with a similar group of cases taken at random from the total series, generally showed more of both cells and protein.

Chest X-Ray. Intercostal paralysis often produced a narrow 'steple-like' chest picture. This was due to flattening of the ribs of the upper chest-wall. A raised

diaphragm, atelectasis and signs of consolidation were other complications noted on X-ray.

Electrocardiogram

Myocarditis in acute poliomyelitis, and more especially in bulbospinal poliomyelitis, is now a well-recognized pathological entity.⁷ Jungeblute and Edwards⁸ isolated the poliomyelitis virus from the hearts of 3 patients dying from poliomyelitis. In 1945 Saphir⁹ reported 10 cases of myocarditis found at autopsy, in a series of 17 patients dying of poliomyelitis, and suggested this as a cause of sudden death in this disease. Clinically, however, the diagnosis of myocarditis may be extremely difficult to make and thus, in the diagnosis, great dependence must be placed on ECG findings. Inverted T-waves, prolongation of Q-T intervals, and S-T segment shifts have been considered to be the most frequent alterations.

ECG studies were recorded in 15 respirator patients. Of these, 6 demonstrated definite abnormal patterns, whilst many of the others revealed a tachycardia and Q-T intervals at the upper limit of normal. Of the 6 abnormal patterns, 4 showed prolongations of the Q-T interval beyond the upper limits of normal, after being corrected for pulse rate, sex and age according to the Ashman's table. A 5th patient, a boy aged 8 years who succumbed shortly after, revealed depressed

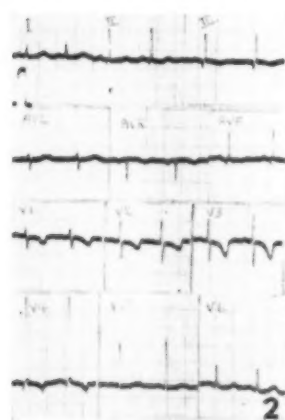


Fig. 2. ECG. A. T. aged 4 years. Inverted T waves VI-V4 with flattened T wave in V5. Q-T interval 0.26 seconds.

(aged 14 years) is still at present (4 weeks later) in the tank respirator with complete intercostal, diaphragmatic and limb paralysis—all 4 limbs being totally paralysed. Fig. 3 illustrates the ECG of the last case.

It will be seen from Fig. 3a that the Q-T interval is prolonged to 0.44 seconds. Inversion of the T-waves is seen throughout the unipolar chest leads. The 2nd ECG (Fig. 3b) was recorded 48 hours later. This shows an extension of the Q-T interval to 0.48 seconds.

Although initially the pulse rate was 110 per minute, by the time the first ECG (Fig. 3a) was taken (a few days after admission) the rate had slowed to 60 per minute. At the same time the patient had experienced

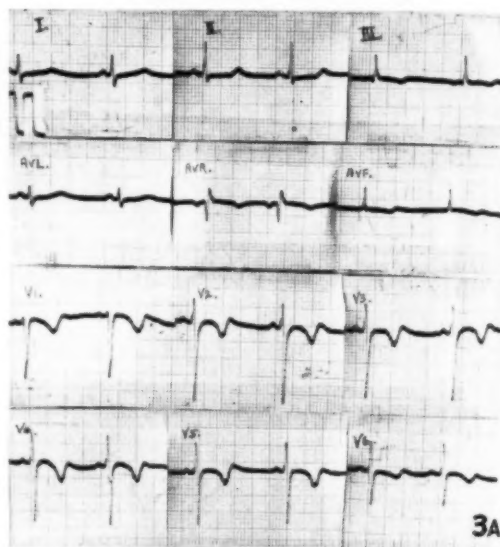


Fig. 3a. ECG. K.M. aged 14 years. Inverted T waves VI-V6. Q-T interval 0.44 seconds.

difficulty in swallowing, necessitating intravenous fluid administration. This association of slowing of the pulse and difficulty in swallowing seemed to indicate the onset of bulbar paralysis with vagal irritation. However,

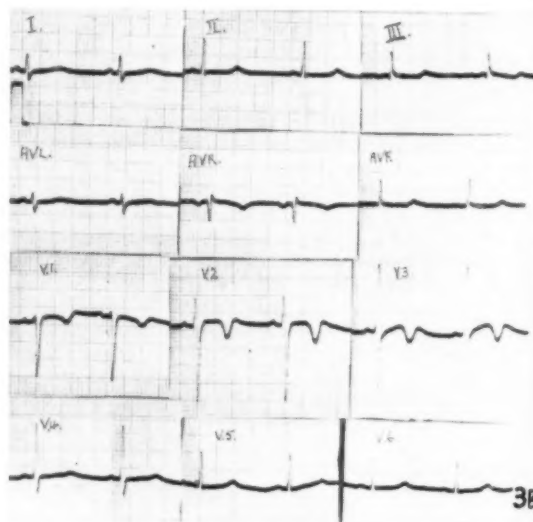


Fig. 3b. ECG. K.M. 48 hours later. Inverted T waves VI-V3. Flattened T wave V4. T wave in S III now upright. Q-T interval now prolonged to 0.48 seconds.

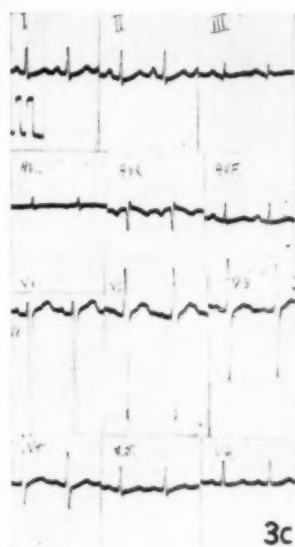


Fig. 3c. ECG. K.M. 14 days later. T. waves VI-V6 now all upright. 'Plateau' T waves V2-V4. Q-T interval 0.3 seconds—upper limit of normal. Pulse rate 120 per minute.

binding power 29 mEq. At the time of the 3rd ECG (Fig. 3b) they were: Sodium 133 mEq., chlorides 102 mEq., potassium 4.6 mEq. The electrolytes were all within normal limits and could not be held responsible

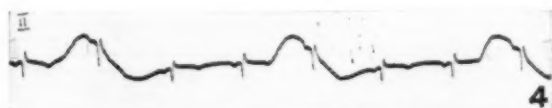


Fig. 4. ECG. Illustrating tank respirator interference, which may be excluded by using the dome of the respirator, while recording the ECG.

for the ECG changes. When a cardiograph was taken with the respirator in action, respiratory deviations, as shown in Fig. 4, were recorded. This respiratory interference could be excluded by using the dome of the respirator while recording the ECG.

Tests for Hypoventilation and CO₂ Retention

Measurement of expired air was carried out by means of a special portable CO₂ indicator. It was observed that even the patient with marked respiratory distress showed no increase in the CO₂-content of expired air (tidal air). This was probably due to compensatory hyperventilation, and it was useless as an index for artificial respiration. However, once the patient was admitted to the tank respirator, a truer indication of CO₂ accumulation was at times recorded, and appeared to be rather a more useful test for hyperventilation.

The plasma CO₂-combining power was also not a satisfactory index of hypoventilation. Blood tests on 17 respirator cases with obvious clinical signs of hypoventilation showed the CO₂-combining power to be within normal limits. Carroll¹¹ has shown that the most accurate method of evaluating alveolar ventilation, and also the distribution of ventilation (whether local or general), is by measurement of the arterial oxygen and arterial CO₂ tensions. He used the methods of Ryley and Van Slyke in his analysis. Oximetry, too, would have at least given the oxygen saturation of the blood. Unfortunately, owing to the large number of patients to cope with, and certain technical difficulties, the benefits of a more scientific assessment as regards hypoventilation had to be dispensed with.

Stool Investigation for Poliomyelitis Virus

The poliomyelitis virus isolated from the respirator patients was in each case type-I Brunhilde. In the total series, although type III (Leon) was occasionally isolated from the stool, type I was the responsible virus in the vast majority of cases. This is in accordance with the finding of Freyche,¹² who found that type I predominated in the majority of outbreaks, particularly in the severe ones, all over the world.

SPECIAL PROCEDURES

Laryngoscopy. Laryngoscopy was essential in assessing the amount and quality of the mucus present as well as the degree of mobility of the vocal cords. Where difficulty was encountered, however, this procedure was not persisted with and one was satisfied with inspection of the pharynx and the suctioning of any mucus present.

Bronchoscopy. This procedure, through the vocal cords as well as through a tracheostome, was performed in a few cases where atelectasis or acute obstruction was diagnosed. In two cases with atelectasis (aged 2 years and 1½ years) some slight improvement seemed to follow, but it was concluded at the time that, in small children particularly, similar benefit would have resulted had a fine rubber suction-catheter been passed. Bronchoscopy generally demonstrated, however, that in the respirator case it was not so much mucus in the trachea that was the danger, but rather the congestion, mucus and spasm in the smaller inaccessible bronchi and bronchioles further down.

Tracheotomy

Tracheotomies were performed on 6 cases, of which 2 were terminal procedures, the indications being the development of acute and alarming obstructive signs. Both these patients died shortly after, despite thorough and immediate suction through the tracheostome and continuous oxygen.

The remaining 4 tracheotomies were elective procedures performed on cases which were of the so-called 'wet' type of bulbo-spinal poliomyelitis. These patients showed signs of progressive deterioration, with increasing pulse rate, excessive mucus, weakly mobile vocal-cords and difficulty in swallowing. Despite thorough suction and continuous oxygen, progressive hypo-ventilation could not be checked and it seemed as

if the pressure of the tank respirator, although increased, was becoming ineffective. The tracheotomies were thus performed with a view also to changing to intermittent positive-pressure ventilation (IPPV). Cuffed tracheotomy tubes were therefore used.

A high tracheotomy was performed in each case, under local anaesthetic. The precaution of leaving at least one tracheal ring below the cricoid cartilage, so as to prevent post-cricoid stenosis, was observed, and the whole operation was performed with the patient in the respirator. This would not have been possible without the diaphragm fitting of the modern tank respirator (Drager). The nursing of such a patient certainly became no easier, the nurse having to be trained in the careful and judicious use of suction through a tracheostome and to recognize obstruction within the tracheotomy tube and deal with it accordingly. Although temporary improvement followed, all the tracheotomy patients died—usually within a few days.

Bulbospinal poliomyelitis, with respiratory paralysis, is clinically often grouped into the 'wet' and 'dry' types. The 'dry' type should not require a tracheotomy. In rare cases the vocal cords, through abductor paralysis or adductor spasm, produce continuous obstruction and hypoventilation. Temporary intubation should then rather be considered.

It is the 'wet' type which presented the most difficult problem. In this type of case, the tendency to do an early tracheotomy to relieve the patient of his secretions and to promote an adequate airway is indeed great. But it must be realized that in many of the cases it is the excessive secretion in the inaccessible smaller bronchi and bronchioles which is the basic cause of hypoventilation, pulmonary oedema, atelectasis and finally death. Physiologically, the cough, or the sudden release of positive pressure within the chest, is the only effective means by which secretions far down in the bronchial tree may be expelled. Now it has been observed in the present series that even the severest type of bulbospinal poliomyelitis showed, on laryngoscopy, the absence of total paralysis of the vocal cords; the vocal cords, although at times acting very weakly indeed, could still open and close. This was a point of importance, because it indicated that some positive pressure could possibly still be developed within the chest, by means of pressure developed with the aid of the respirator acting against a closed glottis; whereas, once a tracheotomy had been performed, the lungs were then 'open' and no such positive pressure could develop and therefore no expulsion of secretions be effected.

Tracheotomy, with the insertion of the tube, often produced spasm of the whole bronchial tree, with increased congestion and secretion. It merely allowed the secretions from the trachea and major bronchi to be withdrawn. Also the inflated cuff of the tube, which is considered to be a great advantage in that it prevents the inhalation of foreign material, produces overstretching of the lumen of the trachea and injury to its mucosa.¹³ Finally let it be said that the weaning of a respirator patient is difficult; with the added complication of tracheotomy the difficulties are increased tenfold.

The view which was gained was, therefore, that the poliomyelitis respirator-case could best be treated, without a tracheotomy and more along physiological lines, such as the following:

A. Allow the patient in the tank respirator to develop a progressively stronger positive pressure within the chest. This will from the outset allow for the spontaneous expulsion, however small, of pulmonary and bronchiolar secretions. The cough reflex may take months to return or may never return, but the ability to develop some degree of positive pressure must always eventually be obtained in the patient who survives. This would never be possible in a patient with a patent tracheotomy.

B. Position the tank respirator into a steep Trendelenberg so as to allow gravity to assist in drainage of secretions away from the dangerous inhalation area.

C. Provide constant medical attention to enable laryngoscopic examination when necessary and the suctioning of secretions from trachea and major bronchi by means of a rubber catheter.

D. Provide specially-trained nursing staff to keep the larynx and pharynx free of secretions at all times.

E. Introduce intragastric feeding per nasal tube or intravenous nourishment at the first sign of difficulty in swallowing, so as to prevent the inhalation of food material.

In a large series of 426 'wet' cases Lassen,¹⁴ a foremost authority on bulbospinal poliomyelitis, reports 53% deaths in tracheotomized patients as opposed to 57% deaths in untracheotomized. These figures do not reveal any appreciable advantage brought about by tracheotomy. Lassen states that 'the main indication for tracheotomy is obstruction of the airway, with reduced ventilation, that cannot be relieved by postural drainage and intermittent continuous suction'. This also happened to be my indication for the 6 tracheotomies performed in the present series, but cannot reconcile this attitude towards tracheotomy with his (Lassen's) statement in the same article that 'the general tendency now (1955) seems to favour early, if not prophylactic, tracheotomy'.¹

Woolmer¹⁵ also advocates tracheotomy in bulbospinal poliomyelitis, yet he indicates at the same time that coughing usually occurs when the trachea is opened and that this is distressing to the patient. Tracheotomy, then, is being performed on the patient with a good cough-reflex! How is one to reconcile a good cough reflex with bulbospinal poliomyelitis associated with respiratory paralysis? A feature of this respirator series has been the inability of the patient to cough. A patient with a good explosive cough-reflex would surely not require a tracheotomy, nor the assistance of a respirator for that matter.

My opinion is that a number of the survivors—89% of whom had no cough reflex on leaving the respirator—would not have survived with the added complication of tracheotomy. This procedure should be reserved for specially-selected cases where postural drainage and efficient suction (as outlined above) fails to prevent the excessive accumulation of secretion and progressive hypoventilation, and not simply because a case happens to be a bulbospinal type of poliomyelitis.

Intermittent Positive-Pressure Ventilation (The Poliomat)

The Poliomat used was of the 'Drager' type, an apparatus producing intermittent positive-pressure ventilation (IPPV) and operated by means of pressure from an attached oxygen cylinder. It is pressure-sensitive and is easily regulated for rate of respiration and pressure. It supplies a mixture of 50% oxygen and 50% air to the patient. A negative-pressure phase, the importance of which now seems to be recognized, is incorporated.

Intermittent positive-pressure ventilation was applied to 3 severe bulbospinal poliomyelitis cases on whom tracheotomy had already been performed. In 2 of the cases (children) progressive deterioration continued until coma and finally death supervened. The 3rd case, a female aged 28 years, showed definite improvement for a period of about 8 hours, when the pulse rate increased and the volume became poor. A fall in cardiac output resulting from the obliteration of the negative intrapleural pressure brought on by positive-pressure ventilation, was diagnosed. Consequently, the poliomat was discontinued and the tank respirator recommenced. An immediate improvement in the pulse and general condition of the patient followed. It is evident, in this case, that the poliomat, despite its recent negative-pressure phase adjustment, could not prevent the fall in cardiac output. This is a recognized dangerous complication of IPPV.

Berneus and Carlsen¹⁵ have indicated that a fall in cardiac output brought about by IPPV is less pronounced when the positive-pressure phase is shorter. Also, that a positive-pressure phase lasting for about one-third of the respiratory cycle seems optimal. Ritchie Russell et al.,¹⁶ using the Radcliff type of positive-pressure respiration pump with the recent negative-pressure phase attachment, have also stressed the advantage of a very short positive-pressure phase in an attempt to reduce the fall in cardiac output to a minimum.

It is possible that the positive-pressure phase in the abovementioned case, although of short duration, was still not short enough, and thus the fall in cardiac output. However, when one considers the unphysiological expansion of the lung with IPPV on inspiration, then one fails to appreciate how an intrapleural negative pressure, essential for adequate venous filling of the heart, can possibly develop, even though the positive-pressure phase be very short. Expiration, even though assisted by the negative-pressure phase, is probably still largely a rebound phenomenon of the chest forcibly expanded during IPPV. The practical benefits of the negative-pressure phase remain extremely difficult to assess; it is probably more useful in the ventilation of the lung than in the production of pressure changes favourable to cardiac output.

The modern tank respirator, such as the Drager, is therefore still to be considered the most physiological method known of applying artificial respiration in cases of poliomyelitis. With its use inspiration depends primarily upon chest-wall and diaphragmatic expansion which produces at the same time a negative intrapleural pressure, ensuring adequate venous filling and satisfactory cardiac output.

If a negative intra-tank pressure producing a suction (inspiratory) force equivalent to the positive pressure of IPPV could be applied, one could then no longer see the alleged advantage of positive-pressure ventilation in bulbospinal poliomyelitis. But, because the negative intra-tank pressure acts over a wide surface-area of the body, the resultant inspiratory force may not be as effective as that produced by the more direct IPPV in maintaining adequate ventilation. Thus, in cases where a state of progressive hypoventilation exists despite all measures to maintain a clear airway, there may be no alternative but to introduce IPPV through a cuffed tracheotomy tube. The disadvantages and complications both of the tracheotomy and of intermittent positive-pressure ventilation must then be considered.

PROGNOSIS

The immediate prognosis of the respirator case depended largely on whether the respiratory paralysis was spinal or bulbospinal. The former indicated relatively good prognosis; in the bulbospinal type the prognosis varied proportionately with the amount and tenacity of the mucus present. The 'wet' case was always in danger.

The cough reflex, ability to swallow, voice volume, degree of dyspnoea and cyanosis, pulse, duration of the temperature, muscular twitchings and the degree of total paralysis, especially that of the upper extremities and neck muscles, were all factors to be taken into account when assessing the prognosis of the poliomyelitis respirator-case.

The ultimate prognosis also depended on the degree and rapidity of improvement in the early stage, being usually poor in those patients whose stay in the respirator had been prolonged to, say, beyond 3 weeks. These were cases associated with marked residual limb paralysis as well as chest paralysis. Also the impression gained was that although many of the survivors remained with weak chests they were not necessarily more prone to pulmonary infection. This was possibly due to continued antibiotic therapy. When, however, pulmonary infection did supervene the prognosis was very grave, and where pulmonary infection preceded or co-existed with poliomyelitis and respiratory paralysis the prognosis was even graver still (see below). Atelectasis, especially if seen late, always indicated a bad prognosis. Marked residual chest deformity denoted a decreased vital capacity with consequent anoxia of tissues and eventual fibrosis and infection of the lungs.

RESULTS

Poliomyelitis varies in severity in outbreaks throughout the world. Indications for the use of respirators and the type of therapy to be administered lack uniformity. It is therefore difficult to compare and assess the results of therapy. Thus in Denmark (1952) 61% of cases of bulbospinal poliomyelitis treated in respirators died, whereas of cases of the spinal type of respiratory paralysis 30% died. In California, USA, the percentage

mortality-rate for respirator patients varied from 17% to 79%. In England (1947) the reported mortality-rate for respirator patients was 57%. In the severe Copenhagen epidemic of 1952 the percentage mortality-rate for respirator patients was, to start with, 80%, and this was reduced to 40% in the later months of the epidemic. It has been stated that this reduction in the mortality rate was due to the introduction of positive-pressure ventilation.

Table IV reflects the mortality rate in the present respirator series. It is to be noted, however, that there were a small number of bulbo-spinal poliomyelitis cases

TABLE IV. MORTALITY IN POLIOMYELITIS RESPIRATOR-CASES

Type of Poliomyelitis with Respiratory Paralysis	Number of Cases			Number of Deaths			Percentage Mortality Rate		
	European	non-European	Total	European	non-European	Total	European	non-European	Total
I. Spinal	14	11	25	2	2	4	14	18	16
II. Bulbo-spinal	19	8	27	15	6	21	75	75	75
III. Encephalo-bulbo-spinal	3	0	3	2	0	2	66	0	66
Total	36	19	55	19	8	27	53	42	49

not requiring respirator therapy nor with fatal issue resulting. These cases are not included in the series.

It will be seen that the total number of deaths in this respirator series of 55 cases was 27 (49%), of which 3/4ths, both in Europeans and non-Europeans, occurred in the bulbo-spinal type (II). Of the 3 cases of encephalo-bulbo-spinal type (III) 2 were fatal (the number is too small to reflect a significant percentage mortality). The purely spinal type (I) had the expected lower mortality rate of 16%.

Of the total of 27 deaths, 19 occurred early, the patient having been in the respirator for not more than 4 days. The 8 'late' deaths (i.e. after the 4th day in the respirator) occurred after varying periods of from 7 to 32 days. In the Copenhagen epidemic of 1952, 50% of the deaths of respirator cases occurred within 3 days and 70% within 7 days.

Although autopsies were not performed, permission being withheld by overwrought parents, it was observed that the 'late' deaths were due mostly to the combined effects of pulmonary infection, atelectasis and respiratory paralysis. The majority of these 'late' cases had histories of pulmonary infection prior to admission and it seemed that it was the persistence of this infection that finally caused death. In the one case (aged 3½ years), X-ray revealed patchy consolidation in both lung fields soon after admission and although improvement was noted in the respiratory muscles, a free airway maintained, and extensive antibiotic therapy administered, death occurred after 32 days in the tank respirator. The combination of pulmonary infection and respiratory paralysis is truly a formidable therapeutic problem.

The bulbo-spinal and encephalo-bulbo-spinal types of poliomyelitis were responsible for the 19 early deaths which occurred. They were rapidly progressive cases of the 'wet' variety. The cause of death was no doubt inadequate arterial oxygen saturation and its com-

plications, the most important of which was pulmonary oedema, probably brought about by increased capillary permeability resulting from the oxygen deficit. Austen *et al.*¹⁷ found that pulmonary oedema was the major autopsy-finding in a series of cases dying of poliomyelitis with respiratory paralysis.

Circulatory collapse was another complication. The concept of peripheral circulatory failure as a direct consequence of involvement of the medullary vasomotor centre must now be revised; even when hypotension is reversed (with Methidrine or noradrenaline) oxygen saturation is not restored. It is important,

also, from a practical point of view to recognize that both oxygen unsaturation and hypotension may be effectively reversed by increasing the oxygen concentration. Thus, circulatory collapse should rather be considered as the direct result of unsaturation and pulmonary oedema.

Although oxygen was always administered in this series, often with notable improvement, this improvement was mostly of a temporary nature, particularly in severe bulbo-spinal poliomyelitis. In these cases, then, provided an obstructive airway can be excluded other factors such as the following must be considered:

- An alveolar-arteriolar diffusion defect.
- Excessive congestion and oedema of the bronchioles and alveoli.
- Specific neurological lesions causing pulmonary oedema.
- Alteration in circulatory dynamics owing to the action of the respirator.
- Retention of carbon dioxide leading to coma and death.
- Myocarditis, either as a result of oxygen deficiency or directly due to the poliomyelitis virus infection.

Residual Paralysis. The 28 survivors of this respirator series have remained with crippling defects; 16 of them (57%), after being finally removed from the respirator, had marked paralysis in both upper and lower extremities as well as respiratory muscle weakness to varying degrees. While some improvement on further treatment may be expected, it is to be concluded that the majority of these survivors of the 'iron lung' will remain with severe permanent disability. At the time of writing, 2 patients of this series are still unable to do without the aid of the tank respirator. One, a non-European adult, has now been in the respirator for over 3 months despite repeated attempts at weaning him from the

respirator. The other is a European aged 14 years, who after 1 month is still completely unable to dispense with the respirator for even a very short time.

CONCLUSIONS

The 3 main features of this poliomyelitis epidemic were:

(a) The high incidence of respirator cases (15%) with type 1 (Brunhilde) as the causative poliomyelitis virus.

(b) The lateness of the epidemic as a whole, with the still later incidence of the respirator cases. Most cases occurred in April 1956, while the greater number of respirator cases occurred in May 1956. This was considered to be related to the late rains and to the late onset of winter climatic conditions.

(c) The spread of poliomyelitis, with its proportionate number of respirator cases, among the non-European population, for the first time in the history of South Africa in epidemic proportions. It seemed that the non-European was no longer receiving a very early natural immunity.

Fatigue and exercise were aggravating factors. Many of the severe respirator patients had travelled over long distances and showed signs of fatigue and strain on arrival at the hospital. This should be avoided if at all possible. Also the danger of inhalation of acid vomitus and other secretions, while in transit, is always present. Exhausting and strenuous exercises should be avoided during a poliomyelitis epidemic.

Although simple clinical tests were adequate as indices for respiratory therapy, more scientific tests should be carried out so as to assess more accurately the degree of hypoventilation and progress of the patient.

The modern tank respirator remains the most physiological as well as practical method of artificial respiration for the poliomyelitis patient. Improvements could, however, be introduced to increase the extent of mechanical posturing of the patient and so further assist the drainage of secretions.

The steep Tredelenberg position is of great importance in promoting postural drainage, in preventing the possible inhalation of foreign matter, and in its beneficial effect on the cardiac output of the poliomyelitis respiratory case.

Trained medical personnel in constant attendance, with a trained nurse for each case, is of vital importance in the successful management of the respirator patient. It is of importance to assess at the outset the amount, viscosity and situation of the mucus present. Difficulty in swallowing must be recognized early to prevent the danger of inhalation of food material and secretions. Oxygen should be administered continuously in the hypoventilated patient.

Tracheotomy and positive-pressure ventilation should not be used as routine procedures in bulbospinal poliomyelitis of the respiratory paralytic type. The 'wet' variety may under special circumstances require tracheotomy and possibly positive-pressure ventilation. The timing of these procedures is then of vital importance.

If performed very late little will be achieved. On the other hand, if they are performed too early or, as some suggest, prophylactically, the patient, particularly if unable to cough, is then being exposed to unnecessary hazards. The 'dry' variety should not require tracheotomy nor, for that matter, intermittent positive-pressure ventilation. In my opinion the cases which according to other writers, responded best to these procedures were of this 'dry' variety of bulbospinal poliomyelitis.

Poliomyocarditis with ECG changes is a definite entity. A fatal issue directly due to myocarditis would, however, be difficult to prove. Hypoventilation with oxygen unsaturation leading to pulmonary oedema and circulatory collapse is to be considered as the final cause of death in most cases. Pulmonary infection is a serious and often fatal complicating factor in these respiratory cases.

It is to be hoped that the large-scale use of the poliomyelitis vaccine, in both the non-European and European population, will at least prevent the respirator type of case, from which the fatalities and severest crippling sequelae have arisen.

SUMMARY

The author reviews the incidence, management, clinical features, investigations, special procedures, prognosis and results of 55 respirator poliomyelitis cases treated at the Boksburg-Benoni Hospital during 1956.

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REFERENCES

1. Berneus, B. *et al.* (1955): *Acta med. scand.*, **152**, 31.
2. Lea, A. J. (1955): *Science*, **121**, 3147.
3. Gear, J. H. S. (1955): *Wld. Hlth. Org. Monog. Ser. No. 26*, p. 39.
4. Siegel, M. and Greenberg, M. (1955): *New. Engl. J. Med.*, **253**, 20.
5. Weinstein, L. and Meade, R. H. (1955): *Amer. J. Obstet. Gynec.*, **70**, 5.
6. Gear, J. H. S. (1956): Personal communication.
7. Lawrence, R. and Carmichael, D. B. (1955): *U.S. Armed Forces Med. J.*, **6**, 12.
8. Jungeblute, C. W. and Edwards, J. E. (1951): *Amer. J. Clin. Path.*, **21**, 601.
9. Saphir, O. (1945): *Amer. J. Path.*, **21**, 99.
10. Gittelman, I. W. *et al.* (1951): *Amer. Heart J.*, **41**, 78.
11. Carrol, D. (1955): *Bull. Johns Hopk. Hosp.*, **96**, 6.
12. Freyche, M. J. *et al.* (1955): *Bull. Wld. Hlth. Org.*, **12**, 4.
13. Woolmer, R. (1955): *Postgrad Med. J.*, **31**, 359.
14. Lassen, H. C. A. (1955): *Wld. Hlth. Org. Monog. Ser. No. 26*, p. 167.
15. Berneus, B. and Carlsten, A. (1955): *Acta. med. scand.*, **152**, 19.
16. Russell, W. R. *et al.* (1956): *Lancet*, **1**, 539.
17. Austen, F. K., Koch-Weser, J. and Field, R. A. (1956): *New Engl. J. Med.*, **254**, 17.

THE SURGICAL SEQUELAE OF BILHARZIAL DISEASE*

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Introductory: For a great many years authorities have been preoccupied with the epidemiological and preventative aspects of this almost universal scourge of the African continent. Undoubtedly the prophylactic measures aimed at killing all snails in the watercourses of the affected areas, and the early diagnosis and treatment of human victims, are of the greatest importance in containing this common disease. With an infestation rate of 80% amongst the Africans and 10% amongst the Europeans in the Central African Federation a sure knowledge of the natural history of schistosomiasis is essential, for in the course of years there occurs a degree of destruction and interference with the function of organs which makes the role of reparative and reconstructive surgery in this disease of great importance. I became aware of these facts soon after commencing surgical practice in Salisbury and it is on the basis of my observations in this regard that I have prepared this paper.

Though Pruner was the first accurately to describe the clinical features of vesical schistosomiasis, the etiological agent was not discovered until 4 years later, when Theodor Bilharz, in 1851, discovered a trematode worm in the portal vein of a patient, naming it the *Distoma haematobium*. Bilharz further correlated the relationship between this trematode and the symptoms of haematuria and diarrhoea which resulted from involvement of the bladder and large bowel respectively, whilst it remained for Leiper to work out the life history of the worm and to demonstrate that the urinary and intestinal forms were caused by infestation with two distinct species of schistosoma viz. *haematobium* and *mansoni* respectively. The work of Leiper, Manson-Bahr and Fairley proved that the fresh-water snail acted as the intermediate host; *Physopsis africana* (genus *Bulinus*) for *Schistosoma haematobium*, and *Biomphalaria pfeifferi* (genus *Planorbis*) for *S. mansoni*.

Bilharzial infestation affects vast tracts of the African continent extending in a wide belt along the Nile River into the Sudan, then along the East Coast, including Eritrea and Somaliland, Uganda, Kenya and Tanganyika. It affects the territories of the Central African Federation and the Eastern half of the Union of South Africa (Eastern Transvaal and Natal), extending to the Cape on the East Coast. Portions of French West Africa, Sierra Leone and the Gold Coast are also affected. Bilharziasis also occurs in Japan, China and the Philippines (*S. japonicum*) as well as in South America and the West Indies, so that if one accepts the global nature of modern medicine and surgery this becomes a disease of great importance as well as great interest.

NATURAL HISTORY

The sexually-distinct digenetic trematodes of the genus *Schistosoma* inhabits the portal system of the human

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victim of this disease. The 11-mm.-long male worm is shorter and broader than the female of the species and widens just caudally to the ventral suckers to form a gynaecophoric canal, within which the female is enclosed in times of sexual activity. The lateral-spined ova of *S. mansoni* are deposited mainly in the colon and rectum, whilst the terminal-spined ova of *S. haematobium* reach the vesical plexus and are deposited in the bladder and lower ureter, initiating the pathological changes which in the course of time may require surgical attention.

Many eggs, however, are voided in the urine and faeces, perpetuation of the life cycle becoming contingent upon their reaching the appropriate fresh-water snail within 24 hours. Osmotic pressure effects cause disintegration of the ova's chitinous shell, with release of its contained miracidium, which penetrates the snail's antennae and, reaching the snail's subcutaneous tissues, develops through the sporocyst stages into the bifid-tailed larval cercariae. The cercariae bore their way through the snail's soft tissues and are ejected in puffs from the snail's pulmonary system into the surrounding water.

The cercariae possess, in primitive form, all the adult appendages and, coming into contact with the skin or mucous membrane of man, they pierce their way to the lymphatics, provoking at their sites of entrance small reddish-brown papules known as 'swimmer's itch'. Reaching the venous system the trematodes travel to the right heart and thence via the pulmonary circulation to the lungs. Returning to the left heart they are then dispersed via the aorta to the gastro-intestinal tract, returning to the portal vein, from where they commence their retrograde sojourn along either the superior or inferior mesenteric vein, thus reaching their urinary and intestinal destinations.

During this migratory period, systemic disturbances are not uncommon. General ill-health, malaise and proneness to fatigue may be manifest, whilst recurrent bouts of pyrexia of uncertain origin may cause diagnostic difficulty. Urticaria, transient pulmonary infiltrations and generalized lymphadenopathy are not unusual features, whilst haematological investigations may disclose a normochromic anaemia associated with an eosinophilia of 10-60%.

THE URINARY SYSTEM

The Bladder

The urinary tract is peculiarly susceptible to oviposition by *S. haematobium*. After the migration of the coupled worms to the vesical venous system the female deposits her eggs in the terminal venues, the ova advancing to the submucous layer of the bladder. Acting as a vesical irritant, the ovum sets up a local inflammatory reaction, which may be visualized cystoscopically early in the disease, at a stage when microscopic examination of the urine will show it to be teeming with terminal-spined ova and red cells. Cystoscopic examination at this stage

discloses an intense hyperaemia and oedema of the peri-ureteric vesical mucosa. In the course of the next 6 weeks grayish-yellow tubercles will be visualized on the trigone and around the ureteric orifices, a fine zone of hyperaemia being discernible around the tubercles. Urinary microscopy at this stage may fail to reveal ova, but cystoscopic biopsy of pathological foci readily affords histological confirmation of the diagnosis.

Blockage of the submucous glands in association with the inflammatory reaction results in the formation of pale bullous cysts, which are seen at cystoscopy to be arranged focally or in clusters. Occasionally one has seen an appearance not unlike cystitis cystica. Cystoscopic control during systemic antimony therapy permits assessment of the local response to treatment, and permits assurance that the lesions are reversible. After completion of treatment the affected vesical mucosa bears a permanent golden-yellow punctate appearance.

With progression of vesical changes, the epithelium becomes heaped up into papillary projections by the vascular inflammatory granulation-tissue which develops. These changes are in keeping with changes, demonstrated by Rolnick (1949), that occur when the vesical mucous membrane is exposed to irritation. It is, in my opinion, wrong to refer to these masses as papillomata, which implies that they are neoplastic in nature, the true papilloma being notorious for its malignant propensities and for its ability to give rise to seedling growths even when histologically benign. These masses respond extremely well to a combination of systemic therapy and local cystoscopic fulguration, leaving small fibrotic nodules as the sole evidence of their past existence. I would therefore suggest that these masses be referred to as papillary bilharziomas, a term that adequately describes their inflammatory nature.

Ulceration of the bladder, though not common, may occur, and a vesico-vaginal fistula may follow. Rupture of the bladder may take place at the site of bilharzial ulceration, and it is as well to remember that malignant vesical ulceration may be associated with bilharzial cystitis; hence the necessity for histological study of a biopsy specimen before systemic antimony therapy is begun. Secondary infection may result in a focal or general phosphatic incrustation of the bladder mucosa.

It is not without some interest to refer to the rarity of urinary lithiasis in the African despite the frequency of gross structural changes. Thus amongst 66,842 Bantu admissions only 14 cases of calculus disease were discovered (10 vesical, 2 urethral, 1 renal and 1 ureteric). During the same period of time 84 cases of urinary lithiasis occurred amongst 28,547 European hospital admissions. Undoubtedly urinary stagnation is less important than the low dietary calcium and acid ash-residue of the African's diet, in the pathogenesis of urinary lithiasis.

Extremely striking is the frequency of vesical, and occasionally ureteric, calcification which follows heavy bilharzial infestation. The calcification is arranged concentrically, providing a marked resemblance to the radiological appearance of a foetal head *in utero*.

Diminution of the bladder capacity will give rise to back-pressure effects, with varying degrees of mega-

ureter and hydronephrosis, but it is often a source of surprise to find that, despite gross organic structural changes, physiological reserves are such that function is not too greatly disturbed.

It has long been held, on rather indefinite evidence, that there is a close etiological relationship between bilharzial infestation and carcinogenesis. Since Ferguson in 1911 published his observations on a series of 40 cases of vesical bilharziasis associated with primary malignant disease of the bladder, it has been continually imputed that the irritative effects of the trematode ova together with the effects of long-standing sepsis exert a focal carcinogenic effect. In an attempt to assess this problem in the light of experience in Salisbury I have analysed the incidence of primary vesical carcinoma in European and Bantu. In 28,547 European hospital admissions 20 cases of bladder cancer (0.07%) were seen, whilst during the same period of time 66,842 African admissions provided 78 cases of vesical carcinoma (0.12%). Analysis of the 78 cases of vesical carcinoma demonstrated that in 43 of these cases was there concomitant bilharzial cystitis, vesical calcification or histological evidence of oviposition. In view of the fact that 80% of the African population suffers bilharzial infestation no statistical significance can be attached to the occasional (56.4%) association of both diseases. Moreover, the incidence of bladder cancer in this bilharzial region is no greater than that in non-bilharzial areas (Flocks 1946, Milner 1946, Marshall and Whitmore 1951).

It would also be anticipated that if bilharzial cystitis played a part in focal carcinogenesis, it would do so by causing an epithelial metaplasia and thus produce a squamous-cell carcinoma. The commonest type of vesical cancer encountered in those cases where bilharzia and cancer co-exist is a proliferative carcinoma of transitional or mixed-cell type, whilst the maximal proliferation is found at sites where the ova exist in least concentration. Nevertheless it is a fact that carcinoma occurring in a bilharzial bladder spreads more readily to adjacent organs and structures.

The Ureter

It has been indicated above that the earliest vesical involvement occurs in the peri-ureteric region. It is therefore logical to anticipate that cicatrization and fibrosis at the ureteric orifice should occur, resulting in stricture and obliteration of that orifice. The traction effects of peri-ureteric fibrous tissue may, and often do, result in a gaping 'golf-hole' ureteric orifice not unlike that of tuberculosis. The resultant incompetence of the uretero-vesical mechanism permits reflux of urine up the ureter and, augmented by superposed recurrent sepsis in the ureter and kidney, gives rise to one form of bilharzial mega-ureter and hydronephrosis.

The pelvic ureter often suffers oviposition and the subsequent pathological changes will determine whether ureteric stricture, ureterectasia, or ureteric calcification will follow. By ureterectasia I refer to a primary focal dilatation in the lower ureter, unassociated with distal obstruction or uretero-vesical incompetence. It is due to the constant stress imposed by the propulsion of urine

on an area weakened by fibrous tissue-replacement of the destroyed contractile muscle layer. This localized dilatation results in varying degrees of neuro-muscular incoordination in the ureteric propulsive effort and progressive dilatation occurs in a cephalad direction.

Bilharzial mega-ureter may thus follow ureteric stricture localized to the orifice or to the pelvic ureter; it may follow ureterectasia and ureteric calcification; it may result from uretero-vesical incompetence; or it may follow back-pressure from a small-capacity bladder.

Without wishing to discourse at length on the indications for surgical treatment in the sequelae of bilharzial disease, I would like to mention a few of the procedures which may provide great relief:

Cystoscopic meatotomy of the stenosed or cicatrized ureteric orifice, followed by regular bougie dilatation, may confer great benefit on the patient, whilst ureteric bouginage often controls stricture of the lower ureter and prevents back-pressure effects. Bouginage, however, is useless in ureterectasia, so that an early decision should be made to resect this segment of ureter if recurrent sepsis or back-pressure effects ensue. Similarly ureteric resection is carried out if a stricture is impassable or repeated dilatations prove ineffectual. After resection of several inches of lower ureter it has always been found possible to perform a uretero-cystoneostomy, but if excessive tension prevents anastomosis it is possible to bridge the gap with a length of ileum. Transplantation of the ureters into the pelvic colon would be indicated if a completely disorganized bladder with internal or external fistula existed, whilst ileocystoplasty may permit an increase in bladder capacity where this is desirable. Nephrectomy or nephro-ureterectomy may have to be performed on its merits but one must be absolutely certain that the contralateral kidney is not heir to progressive damage, whilst nephrostomy or pyelostomy may be a necessary preliminary manoeuvre before excision of the distal ureter can be considered.

THE ALIMENTARY SYSTEM

S. mansoni has a special predilection for that part of the alimentary tract which is drained by the inferior mesenteric vein. Bilharzial colitis and proctitis gives rise to abdominal pain and periodic bouts of diarrhoea with blood and mucus in the stools. The ova may be found in the stools, but sigmoidoscopy is often desirable. The earliest change visualized through the sigmoidoscope is a congested haemorrhagic mucosa, and biopsy of the rectal mucosa readily affords histological confirmation of the disease. The development of a large rectal bilharzioma may cause confusion with carcinoma, but biopsy will readily differentiate between the two, and in passing it can be definitely asserted that rectal or colonic bilharziasis is never potentially malignant; it resolves rapidly with systemic antimony therapy.

Perianal or perineal bilharzial granulomata may occasionally be the presenting lesion, resolving rapidly with antimony therapy.

The vermiform appendix is one of the organs very susceptible to oviposition, but it is interesting to note that in 92% of cases of appendiceal bilharziasis *S. haematobium* is the cause. Thus the association of urinary and

appendiceal bilharziasis is a common one and should be borne in mind when symptoms indicate a mixed urinary and appendicular pattern. It is, however, as well to appreciate that the relationship between the appendix and bilharzial infestation may take two forms:

1. Appendiceal bilharziasis: Oviposition occurs in the appendix, undergoes healing without involvement of the lumen and does not cause clinical disturbance, being a fortuitous finding.

2. Bilharzial Appendicitis: As a result of gross structural change, with partial or total obliteration of the lumen, features of chronic appendicitis result, whilst in a proportion of cases it predisposes to acute and subacute pyogenic appendicitis. Occasionally the appendix is incorporated in a large bilharzial granulomatous mass.

Bilharzial hepato-splenomegaly

The intimate relationship between the liver and spleen on the one hand, and the portal circulation on the other, adequately explains the frequent presence of schistosomal ova in the liver (56%) and to a lesser extent in the spleen (10%) noted by Gelfand (1950) in his autopsy series.

Oviposition in the liver causes a local inflammatory reaction resulting in the formation of multiple tubercles. Only occasionally do tubercles coalesce to form a large hepatic bilharzioma, whilst on rare occasions secondary infection will result in the formation of a liver abscess.

The term Egyptian splenomegaly is synonymous with bilharzial splenomegaly, yet only rarely are ova found in the Egyptian spleens, it being suggested that bilharzial toxins or bilharzial chronic pancreatitis acts as the cause. If one accepts that the syndrome falls into the group now referred to as portal hypertension, then it is probable that the main cause is a trophopathic lobular cirrhosis due to subnutrition, the concomitant bilharzial infestation not playing a great part in its etiology. The possibility that obstruction of the portal veins by the trematode, or by trematodally induced thrombosis, is a factor that has been investigated fruitlessly.

MISCELLANEOUS SURGICAL LESIONS

Bilharzial salpingitis, cervicitis and vaginitis are often encountered and undoubtedly play a role in the causation of sterility and ectopic pregnancy. The presence of bilharzial ova in the uterus and in the centre of uterine fibroids also raise points of interest.

It is interesting to note that only rarely are the male genital organs clinically involved by bilharziasis though the occasional case of bilharzial orchitis does occur, making its consideration in the differential diagnosis of testicular swellings necessary. Though bilharzial tubercles are often noted in the tunica vaginalis it is not a factor in the causation of hydrocoele.

REFERENCES

- Flocks, R. H. (1946): *Canad. Med. Assoc. J.*, **55**, 348.
Gelfand, M. (1950): *Schistosomiasis*. Cape Town: Juta.
Marshall, V. F. and Whitmore, W. F. (1951): *J. Urol.*, **66**, 232.
Milner, W. A. (1946): *Ibid.*, **55**, 607.
Rolnick, H. C. (1949): *The Practice of Urology*. Philadelphia: Lippincott.



ASSOCIATION BRONZE MEDALLISTS¹

The following are the citations read at the recent conferring of Association Bronze Medals:

JOHANNES PHILIPPUS DE VILLIERS

Dr. Johannes Philippus de Villiers was born at Calvinia, C.P., and received his early education at the Calvinia High School. He proceeded to the South African College where he obtained the degree of B.A. in Natural Sciences in 1914. After commencing the medical curriculum at the University of Cape Town he graduated B.A., M.B., Ch.B. at Trinity College, Dublin, in 1920. He obtained the D.P.H. (R.C.S. & P.I.) in 1921 and the degree of M.D. in 1922.



Dr. J. P. de Villiers

After a few months in general practice he was appointed to the post of full-time Medical Officer of Health and District Surgeon of the Grahamstown Municipality and Albany District in 1922.

Four years later he was appointed as the first Medical Officer to the Cape Divisional Council, in which post he is still serving. He was instrumental in promoting the Cape Divisional Council Health Control Scheme and in organizing the numerous Health Clinics which at present function with efficiency over the wide areas embraced by his local authority.

In 1950 Dr. de Villiers on his own initiative planned and organized a 500-bedded hospital for non-European tuberculosis at Westlake, now known as the Dr. A. J. Stals Memorial Sanatorium. He deserves the greatest credit for creating and training a nursing staff of non-European nurse-aids under the supervision of non-European staff-nurses and European sisters at a time when it was considered impossible to find the personnel necessary for maintaining so large an institution.

Dr. de Villiers is Chairman of the South African Branch Council and the Joint Examination Board of the Union Government and the Royal Sanitary Institute. He was elected a Fellow of the latter body in 1934. In 1932 he was granted a Carnegie Grant to study Public Health in America and was awarded a Travelling Fellowship by the World Health Organization in 1953. He has served on two Government Commissions of Inquiry and as an External Examiner in Public Health at the University of Cape Town. In view of his experience and standing Dr. de Villiers is rightly regarded as an authority in matters concerning Public Health.

For many years he has taken an active interest in Red Cross work and was awarded the Red Cross Voluntary Medical Services Medal in 1947.

He has been a member of the Medical Association of South Africa for the past 35 years and has at all times taken a most active part in the conduct of its affairs. He was Hon. Secretary of the Cape Western Branch in 1928 and became President in 1951. He has been a member of Federal Council for over 10 years and served on the Executive Committee for a time.

His record of military service is outstanding. He took part in the South West African Campaign in World War I and during World War II was one of the first medical officers to go into the field, ultimately holding the post of A.D.M.S. to the 1st South

African Division in East Africa, Abyssinia and North Africa. He was mentioned in Despatches and awarded the C.B.E. In 1941 he was appointed Commander of the Most Excellent Order of the British Empire. In 1942 he qualified for the Efficiency Decoration and eventually was placed on the Retired Officers' list with the rank of Brigadier.

For his outstanding merit in many fields of work and in view of his long and valuable services to the Medical Association Dr. de Villiers is recommended for the award of the Association's Bronze Medal.

THE LATE LIONEL BERNARD GOLDSCHMIDT

Lionel Bernard Goldschmidt was born at Queenstown, C.P., and received his early education at the local school and at Kingswood College, Grahamstown. After obtaining the B.A. degree at

Rhodes University he became a medical student at King's College Hospital, London. On the outbreak of war in 1914, while still a student, he enlisted in the London Rifle Brigade and as a corporal fought at Mons. Returning to resume his medical studies he obtained the M.R.C.S., L.R.C.P. in 1917 and the M.B., B.S. (Lond.) in 1918. In the latter part of the war he served in the Indian Medical Service.

His name appeared in the South African Medical Register in 1919 but he did not return from overseas until 1922 after obtaining the F.R.C.S. in 1921. He practiced in Cape Town as a urologist and his first appointment was that of surgical registrar at the New Somerset Hospital in 1930. On the opening of the Groote Schuur Hospital in 1937 he became Head of the Urological Unit and served on the hospital staff and as a lecturer in the University of Cape Town until his retirement in 1947. He built up an extensive private practice in Cape Town and deservedly acquired a high reputation as a urological surgeon.

From the outset of his career in South Africa Dr. Goldschmidt took a keen interest in the Medical Association and was appointed Assistant Honorary Secretary of the Cape Western Branch of the B.M.A. in 1923. He gave unique service to the Branch over many years, both as a member of Branch Council and as a member of many committees. During World War II he served on the Branch Emergency Committee. He was elected President of the Branch in 1945.

He acted as Honorary Secretary of the original South African Committee, which co-ordinated the various Branches of the British Medical Association in South Africa before the formation of the Medical Association of South Africa (B.M.A.) in 1927.

In 1945 Dr. Goldschmidt was elected to the Federal Council of the Medical Association and served as a member until ill-health compelled him to resign when in his third term of office. His determination and clarity of thought were assets in debate and combined to make him a most valuable member of Council.

In recent years he threw all his thought and energy into the task of establishing the College of Physicians and Surgeons of South Africa and became the Chairman of a special Committee set up by Federal Council in 1950 to bring a scheme into being. Although ill-health forced him to relinquish his activities when the plans



The late Dr. L. B. Goldschmidt

1. Annual General Meeting (1956): S. Afr. Med. J., 30, 1044 (27 October).

for the proposed College were well advanced, he was spared long enough to see the fruits of his labours when the College was registered under the Companies' Act on 21 July 1955.

He was a prominent worker for Red Cross and deserved great credit for the part he played as a member of the Committee to establish the Red Cross Children's War Memorial Hospital recently opened in Cape Town.

Dr. Goldschmidt had wide interests outside his profession, notably in philately, photography and sport generally and in his lifetime acquired a valuable collection of Africana.

For his many years of loyal service to the Medical Association of South Africa, his outstanding qualities as a man and for all that he did to advance the cause of Medicine, Lionel Bernard Goldschmidt is recommended for the posthumous award of the Association's Bronze Medal.

ROBERT LANCELOT IMPEY

Robert Lancelot Impey was born in Queenstown, C.P. and received his early education at Kingswood College, Grahamstown. He proceeded to Edinburgh University, where he graduated M.B., Ch.B. in 1915. He obtained the F.R.C.S. (Edin.) in 1920 and took the degree of M.D. in 1921, being highly commended for his thesis. In 1936 he was elected a Fellow of the Royal College of Obstetricians and Gynaecologists. For 20 years he served on the South African Reference Committee of the Royal College of Obstetricians and Gynaecologists and recently was elected Vice-Chairman of its South African Regional Committee.

Dr. Impey commenced practice in Cape Town in 1919 and from the outset interested himself in all matters pertaining to the welfare of the medical profession. In due course he was appointed to the staff of the Groote Schuur Hospital and for the past 15 years has held the posts of Senior Gynaecologist and Senior Lecturer in Obstetrics and Gynaecology at the University of Cape Town. Though he has recently retired from these posts he still acts as Lecturer in Medical Ethics in the University.

He became a member of the British Medical Association in 1915 and served on the South African Committee of the British Medical Association before the formation of the Medical Association of South Africa in 1927. He became the Honorary Secretary of the Cape Western Branch in 1926 and was elected President of the Branch in 1942. He has served on numerous standing committees of the Branch Council throughout the years and is still a member of its Ethical Committee. He has served as a member of Federal Council for several terms and at all times has played an extremely active part in the conduct of the affairs of the Association, as indeed he continues to do.

Dr. Impey has been an elected member of the South African Medical and Dental Council continuously for the past 13 years and a member of its Executive Committee for 8 years. His services as a member of the Council have been noteworthy by reason of the conscientious manner in which he has at all times acted for the good of the profession and in the interests of his colleagues, who have reposed their confidence in him at successive elections.



Dr. R. L. Impey

Dr. Impey obtained a commission in the R.A.M.C. in August 1914 and served in France in World War I, where he was Acting Lieutenant-Colonel commanding 139 Field Ambulance. He was awarded the Military Cross during the Battle of the Somme in 1916. Subsequently he served during the campaign in East Africa in 1917 as D.A.D.M.S. with the Expeditionary Forces and was mentioned in Despatches.

At the outbreak of World War II he relinquished his practice in order to serve and was appointed A.D.M.S. Cape Fortress Command. He served later in the Middle East and Italy. At present he holds the position of Consulting Gynaecologist to the Department of Defence. He received the King's Commendation and the Queen's Coronation Medal.

In view of his eminence in the field of obstetrics and gynaecology his distinguished military service throughout two World Wars, his work as a member of Medical Council and his long and faithful service within the Medical Association of South Africa, Dr. R. Lance Impey is recommended for the award of the Association's Bronze Medal.

MEMORANDUM* ON ETHICAL RULES 16, 17, 19 AND 19BIS OF THE SOUTH AFRICAN MEDICAL AND DENTAL COUNCIL

The undermentioned acts or omissions by a medical practitioner or a dentist shall . . . constitute conduct of which the Council may take cognizance under Chapter IV of the Medical, Dental and Pharmacy Act 1928 (Act No. 13 of 1928).

RULE 16. PROFESSIONAL SECRECY

Divulging verbally or in writing any information which ought not to be divulged regarding the ailments of a patient, except with the express consent of the patient or, in the case of a minor, with the consent of his guardian, or in the case of a deceased patient, with the consent of his next-of-kin or the executor of his estate.

Note.—In a court of law, professional secrecy should be contravened under protest after direction from the presiding judicial officer.

The Parliamentary Committee recommends that a certificate similar to those issued by the Mines Benefit Society should be the normal form of certification. In this the doctor would not give any information concerning the nature of the ailment of the patient. In addition, it is suggested that there should be a second certificate in which the nature of the ailment is disclosed, but this

should be addressed to the patient only and should be handed to him so that he might take any action that he likes with it.

RULE 17. CERTIFICATES

Granting a Certificate in his professional capacity unless he is satisfied from personal observation that the facts are correctly stated therein, or has qualified the certificate by the words 'as I am informed by the patient'.

The Parliamentary Committee recommends that this rule remain unaltered.

RULE 19. PROFESSIONAL APPOINTMENTS

A. Medical Practitioners

1. *Acceptance by a medical practitioner of any professional appointment unless—*

- (a) *A notice inviting applications for such appointment shall have been advertised in the public press and in a South African Medical Journal;*
- (b) *Details of the proposed contract are made available to bona fide enquirers and to the Council on request;*
- (c) *The contract of appointment is in writing and sets out clearly the services which the medical practitioner agrees*

* Prepared by the Parliamentary Committee of Federal Council for consideration at meetings of Branches to be called shortly.

to render and the fees or remuneration which will be payable by the party appointing him, to him for such services;

- (d) the contract provides that the medical practitioner shall receive fees or remuneration for the services which he renders only from the party with whom he has contracted, and that that party undertakes liability therefor;
- (e) the fees or remuneration provided for in the said contract are on a basis which is not derogatory to the medical profession or inimical to the interests of the public;
- (f) the contract is such that it does not or is not calculated to serve as a means of advertising the name or practice of an individual medical practitioner or partnership of medical practitioners.

Note.—Any renewal of a contract or any alteration in the terms and conditions of a contract shall be regarded as a new contract, in which case the above requirements must be complied with *de novo*.

2. Permitting his name, profession, qualifications or address to appear on cards, handbills, pamphlets, or notifications of any kind which refer in any way to him holding the said appointment; but this shall not preclude a benefit society notifying its members personally and confidentially of the names and addresses of medical practitioners holding appointments to the said society.

3. Failure by any medical practitioner who has accepted an appointment under this rule to submit for inspection by the Council the contract referred to in this rule within 30 days from the date of posting of a demand therefor in a registered letter from the Registrar of the Council addressed to such medical practitioner at his address as shown in the Register; provided that upon good cause shown by such medical practitioner this period of notice may, in the discretion of the Council, be extended.

The provisions of this rule are entirely satisfactory with the exception of the conditions contained in the paragraph preceded by the word *Note* and relating to A (1).

Renewal of Contract. It is submitted that any renewal of a contract should be regarded as a new contract and should comply with the requirements as set out in Rule 19 A (1). Renewal implies that the contract was in the first instance for a specified period and it is therefore equitable that it should be re-advertised at the expiration of that period.

Alterations in Terms and Conditions. It is considered that any alterations in the terms and conditions of full-time or part-time contractual appointments or full-time or part-time permanent appointments (permanent is used in the sense that the appointment is for an unspecified period subject to a retiring age clause

and subject to being terminated on either side by giving a specified period of notice) should not *ipso facto* be re-advertised provided—

- (a) That in full-time and part-time contractual appointments the alterations in the terms and conditions are not less favourable than the original terms of the advertisement and not more favourable than say a 25% net financial gain.
- (b) that in respect of permanent appointments, full-time or part-time, the terms and conditions are not less favourable than those specified in the original advertisement.

The appointments referred to above are other than appointments made under the Public Service Act and those falling under Rule 19bis.

RULE 19BIS. PROFESSIONAL APPOINTMENTS MADE UNDER THE HOSPITAL ORDINANCES OF THE VARIOUS PROVINCES AND TO UNIVERSITIES AND RESEARCH INSTITUTIONS

1. Acceptance by a medical practitioner or a dentist of any professional appointment under the Hospital Ordinances of the various Provinces, or any professional appointment to a University or Research Institution, unless—

- (a) notice inviting applications for such appointment shall have been advertised in the official journal of the Medical or Dental Association of South Africa (as the case may be);
- (b) details of the proposed appointment are made available to bona fide enquirers, and to the Council on request;
- (c) the contract is in writing and sets out clearly the clinical or professional services which the medical practitioner or dentist agrees to render and the fees or remuneration which shall be payable to him by the party appointing him, for such services.

Note.—Transfers or promotions in the normal course within a service will not be regarded as new appointments, and such posts need not be re-advertised.

2. Failure by any medical practitioner or dentist who has accepted an appointment under this rule to submit for inspection by the Council the contract referred to in this rule within 30 days from the date of posting of a demand therefor in a registered letter from the Registrar of the Council addressed to such medical practitioner or dentist at his address as shown in the Register; provided that upon good cause shown by such medical practitioner or dentist this period of notice may, in the discretion of the Council, be extended.

It is not recommended that this rule be altered.

PASSING EVENTS : IN DIE VERBYGAAN

Dr. W. Silber, M.B., Ch.B. (Cape Town), F.R.C.S. (Edin.) has returned to Cape Town after spending the past 2 years in post-graduate work in surgery at the Postgraduate Medical School, London.

* * *

Dr. Morris Fishbein, of Chicago, who was for many years Editor of the *Journal of the American Medical Association* and is now Medical Editor of *Excerpta Medica*, has been honoured as recipient of the 1956 Distinguished Service Award given by the American Medical Writers' Association. The award, comprising a plaque and gold medal, was presented to Dr. Fishbein at the banquet held in Chicago on the occasion of the annual meeting of the latter association. Dr. Fishbein, recipient of many honours, has been decorated by the governments of Cuba, Italy, Holland, Spain and the USA.

* * *

Courses in Psychiatry. McGill University, Montreal, Canada, announces openings for training in the Department of Psychiatry for medical graduates who have completed a general internship of one year. The 4-year diploma course provides basic training in the first 2 years and in the last 2 years the alternatives of (a) general hospital, community or university psychiatry, (b) child psychiatry and (c) preparation for research psychiatry. Instruction

may also be arranged for shorter periods or in special fields, including, on special application, psycho-analysis. Accepted applicants will receive free board and lodging (or living-out allowance) plus an honorarium ranging from \$40 to \$100 a month, or more in the later years. Additional emoluments up to \$1800 a year are available under certain conditions, about which information may be obtained. Applicants should write to the Chairman of the Department of Psychiatry, McGill University, Montreal, Canada.

* * *

The Wedding took place in Johannesburg on 26 October 1956, of Dr. A. L. Agranat, Vice-President of the Southern Transvaal Branch, and Mrs. Sylvia Blumberg.

* * *

Lede word daaraan herinner dat hulle die Sekretaris van die Mediese Vereniging van Suid-Afrika, Posbus 643, Kaapstad, sowel as die Registrateur van die Suid-Afrikaanse Mediese en Tandheelkundige Raad, Posbus 205, Pretoria, moet verwittig van enige adresverandering.

Versuim hiervan beteken dat die *Tydskrif* nie afgelewer kan word nie. Dit het betrekking op lede wat oorsee gaan sowel as dié wat binne die Unie van adres verander.

NEW PREPARATIONS AND APPLIANCES : NUWE PREPARATE EN TOESTELLE

AN APPARATUS FOR THE TREATMENT OF ASPHYXIA NEONATORUM

DR. OTTO JUENGLING

Chief Anaesthetist, Hospital 'Im Friedrichshain', Berlin *

A new apparatus has been constructed to enable the midwife, without medical help, to treat cases of asphyxia neonatorum without intubation and without oxygen.

The apparatus consists of a rubber bellows with valves, a face mask, and a screw-clamp to fix the apparatus to a table. The method of use is as follows:

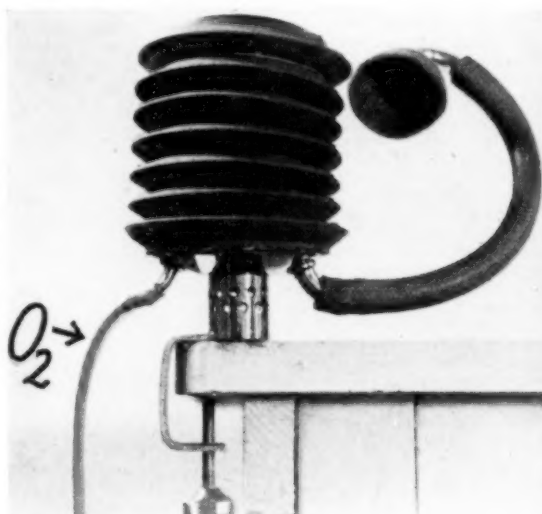
The mask having been put on the baby's face, the rubber bellows is compressed 20-30 times per minute, so that fresh air is introduced into the lungs, and the rubber bellows is refilled with air through the valve in consequence of its elasticity. To control the air movements observations must be maintained of the movements of the thoracic wall. A safety-valve limits the maximum pressure to 15-18 cm. H₂O. To prevent hypercapnia it is necessary to remove the mask from the baby's face at frequent intervals.

The apparatus is about 6 inches long, the bellows being about 3½ inches in diameter, and the weight is a little over 1 lb. It can therefore easily be carried by the midwife.

In the hospital, oxygen can be added to the air.

The apparatus is produced by Firma Carl Reiner, Mariannengasse 17, Vienna IX, Austria.

* Director, Prof. H. Klose.



REVIEWS OF BOOKS : BOEKRESENSIES

A NEW TEXT-BOOK OF PHYSIOLOGY

Text-book of Medical Physiology. By Arthur C. Guyton, M.D. Pp. xiv + 1030. Illustrations, 577 figs. \$13.50. Philadelphia and London: W. B. Saunders Company. 1956.

Contents: Part I. Cellular Physiology and Introduction to Human Physiology. 1. Developmental and Cellular Physiology. 2. The Internal Environment and the Philosophy of its Control. Part II. Nerve and Muscle Physiology. 3. Membrane Potentials and Action Potentials. 4. Function of Nerves and of the Myoneural Junction. 5. Function of Skeletal and Smooth Muscle. 6. Cardiac Muscle and its Rhythmic Contraction. 7. The Heart as a Pump and the Cardiac Cycle. 8. Dynamics of Systemic Blood Flow. 9. Capillary Dynamics. 10. Blood Volume and its Automatic Regulation. 11. Extracellular and Interstitial Fluids; The Lymphatics; Edema. 12. The Special Fluid Systems of the Body—Pleural, Pericardial, Synovial, Peritoneal, Ocular, and Cerebrospinal. 13. Cardiac Output, Venous Pressure, and their Interrelationships. 14. Arterial Pressure Pulses; Systolic and Diastolic Pressures. 15. Regulation of Mean Arterial Pressure. 16. Hypertension. 17. Circulatory Shock and the Physiologic Basis of its Treatment. 18. The Pulmonary Circulatory System. 19. The Coronary Circulation. 20. Blood Flow Through Special Areas of the Body. 21. Auscultation and Dynamics of Valvular and Congenital Heart Defects. 22. Cardiac Failure. 23. The Normal Electrocardiogram. 24. Cardiac Arrhythmias and their Electrocardiographic Interpretation. 25. Electrocardiographic Interpretation in Cardiac Myopathies—Vectorial Analysis. Part IV. Body Fluids and the Kidneys. 26. Relationship of Extracellular to Intracellular Fluids. 27. Excretory Function of the Kidney. 28. Control Systems of the Kidney—Regulation of the Extracellular Fluid. 29. The Physiology of Kidney Disease. 30. Acid-Base Balance of the Body Fluids. Part V. The Blood Cells, Immunity, Clotting, and Blood Types. 31. The Red Blood Cells, The Anemias, and Polycythemia. 32. Leucocytes and Inflammation: Agranulocytosis and Leukemia. 33. Immunity and Allergy. 34. Blood Coagulation and Hemostasis. 35. The Blood Groups and Transfusion. 36. The Mechanics of Respiration. 37. Physical Principles of Gaseous Exchange. 38. Transport of Oxygen and Carbon Dioxide Throughout the Body. 39. The Control of Respiration. 40. Physiology of Respiratory Disorders and Their Therapy. 41. Aviation and Deep-Sea Diving Physiology. Part VII. Neurophysiology. 42. The Central Nervous System Ganglion and Basic Neuronal Circuits. 43. The Somesthetic Sensations. 44. Pain—Referred Pain, Visceral Pain, and Headache. 45. Function of the Spinal Cord and Cord Reflexes. 46. Functions of the Hindbrain—Central Facilitation and Inhibition; Equilibrium. 47. The Motor and Premotor Systems of the Central Nervous System. 48. Function of the Basal Ganglia and the Cerebellum. 49. Integrative Functions of the Cerebral Cortex. 50. The Autonomic Nervous System. 51. Sleep, Brain Waves, Epilepsy, Emotions, and Psychosomatic Disorders. Part VIII. The Special Senses. 52. The Optics of Vision. 53. The Retina. 54. The Neurophysiology of

Vision. 55. The Physiology of Hearing and its Abnormalities. 56. The Sensations of Taste and Smell. Part IX. Digestion, Metabolism, and Energy. 57. Motor and Secretory Functions of the Gastrointestinal Tract—the Mouth and the Esophagus. 58. The Stomach, Pancreas, and Biliary System. 59. Motor and Secretory Functions of the Small and Large Intestines. 60. Digestion, Absorption, and Metabolism of Carbohydrates. 61. Digestion, Absorption, and Metabolism of Fats. 62. Digestion, Absorption, and Metabolism of Proteins. 63. Enzymatic Transfer of energy from Foodstuffs to Functional Elements of the Cells: Chemistry of Muscular Contraction. 64. Vitamin and Mineral Metabolism. 65. Dietary Balances, Basal Metabolic Rate, Starvation, and Obesity. 66. Body Temperature, Temperature Regulation, and Fever. Part X. Endocrinology. 67. Introduction to Endocrinology—The Pituitary Hormones: The Pineal Body and the Thymus. 68. Insulin and Diabetes. 69. The Thyroid Hormone—Thyroxine. 70. The Adrenocortical Hormones. 71. Bone, Parathyroid Hormone, Vitamin D, and Calcium and Phosphate Metabolism. 72. Reproductive Functions of the Male, and the Male Sex Hormones. 73. Sexual Functions in the Female, and the Female Sex Hormones. 74. Pregnancy and Lactation. Part XI. Radiation. 75. Nuclear Physics, X-rays, and their Relationships to the Human Body. Index.

It is difficult nowadays to justify the publication of yet another text-book of human physiology. This new book by Guyton has little to add to the story as already told in the established text-books, but it tells the story well. Unlike most of the large standard works today it is a one-author text-book and it does achieve the uniform perspective which the author claims for it and which justifies its existence.

General principles are stressed, particularly the principles of homeostasis and of the oscillation of normal control mechanism which is associated with delayed response and a high amplification-factor. The book caters for modern preoccupations in its sections on aviation physiology, on the biological effects of ionizing radiation, and on psychosomatic disorders. There are no serious omissions and each chapter ends with a useful list of references, particularly to review articles.

The emphasis throughout is on applied physiology. Pathological conditions are described in terms of their disordered physiology and their treatment is described in terms of applied pharmacology. The text is up to date but the author's views, especially on medicine and surgery, are sometimes heterodox

and he fails to not generalise. The style is of the Company. it is less successful of medicine

Medical By Ffr 6s. net. 1956.

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and he fails to emphasize in such cases that the view expressed is not generally accepted.

The style is clear and the illustrations well chosen. The format is of the high standard one expects from the W. B. Saunders Company. This is a good text-book of applied physiology but it is less suitable for the student of physiology than for the student of medicine or the medical postgraduate.

A.W.S.

MEDICAL PHILOLOGY

Medical Terms—Their Origin and Construction. Second Edition. By Ffrangcon Roberts, M.A., M.D., F.F.R. Pp. viii + 88. 6s. net. London: William Heinemann Medical Books Ltd. 1956.

Contents: Part I. 1. Introduction: The irrational element. The immortality of words. The unthinking acceptance of words. Looseness of expression. Semantic devices. Etymological errors. Grammar and spelling. American usage. Reform of nomenclature. 2. The Sources of Medical Words: Anglo-Saxon, Graeco-Roman, Romance. Modern inventions. Arabic. Modern German. 3. The persistence of Primitive Conceptions: Soma, psyche, pneuma. Humoral theory. Feelings and emotions. 4. The Principles of Derivation: Association. Change in meaning: contraction, expansion, transfer, reversal. Words of obscure or unknown origin. Words derived from mythology and history. 5. Word-construction: Combining forms. General terms. Rules of construction. Part II. 1. Greek and Latin Anatomical Synonyms. 2. Resemblance. 3. Diminutives. 4. Receptacles, Cavities. 5. Membranes and Partitions. 6. Openings and Communications. 7. Texture, Fabrics. 8. Air, Breath. 9. Fluids. 10. Animals. 11. Plants. 12. Substances. 13. Quantity. 14. Numbers. 15. Paired and Unpaired. 16. Size. 17. Form, Shape. 18. Colour. 19. Hardness, Softness, Thickness. 20. Surface. 21. Identity. 22. Human Relations. 23. Position. 24. Relative Position. 25. Cortex and Medulla. 26. Arrangements, Distribution. 27. Approximation, Separation. 28. Visibility. 29. Sounds. 30. Temperature. 31. Time. 32. Relative Time. 33. Speed. 34. Tension. 35. Expansion, Contraction. 36. Stimulation. 37. Change, Modification. 38. Goodness, Badness: Ease, Difficulty. 39. Movement. Transport. 40. Sensation, Feeling Affection. 41. Special Senses. 42. Cutaneous Sensations. 43. Mental States. 44. Growth, Reproduction. 45. Nutrition, Digestion, Excretion. 46. Construction, Destruction, Obstruction. 47. Violence, Danger, Attack. 48. Protection. 49. Wasting, Decay, Death. 50. Pharmaceutical Abbreviations. 51. Additional Synonyms. 52. Words not to be Confused. Index of Words. Index of Subjects.

Two years have passed since the first edition of this book appeared and its apparent popularity has made a second edition necessary. It was my privilege to review the book when it first appeared and I stated then that I considered it to be a useful contribution which would be appreciated by students of all kinds. I still think so.

A.H.T.

HAEMATOLOGY

Practical Haematology. (Second Edition.) By J. V. Dacie, M.D. (Lond.), M.R.C.P. (Lond.). Pp. vii + 229, with 43 illustrations. 20s. net. London: J. & A. Churchill Ltd. 1956.

Contents: 1. Collection of Blood and Normal Values. 2. Basic Haematological Techniques: I. 3. Basic Haematological Techniques: II. 5. Use of Basic Haematological Techniques in Clinical Medicine. 6. Supplementary Optical and Staining Techniques. 7. Bone-marrow Biopsy. 8. Laboratory Methods Used in the Investigation of the Haemolytic Anaemias. 9. L.E. Cells and Leucocyte Agglutinins. 10. Investigation of the Haemorrhagic Disorders. 11. Blood Groups and the Laboratory Aspects of Blood Transfusion. 12. Miscellaneous Tests. 13. Appendices: 1. Preparation of Certain Reagents. 2. Preparation of Glassware. 3. Methods of Cleaning Slides and Apparatus. 4. The Sterilization of Syringes and Needles.

It is only 5 years since the 1st edition of this eminently practical little book first appeared but such has been the progress in haematology that this new edition is more than called for. Dr. Dacie has revised and rewritten the whole book and has succeeded, as in the 1st edition, in making it a very valuable laboratory manual. Haematology is now such a broad field that the day of the 'complete haematologist'—an expert in all fields of haematology—has gone for ever. Despite this the author displays a mastery of the whole subject. One expects the section on haemolytic mechanisms to be good—it is after all, the author's own special field. But he displays the same degree of excellence in the rest of the book, whether it be in the description of basic haematological techniques, haemorrhagic disorders, or blood groups and blood transfusions.

A few minor suggestions for the 3rd edition may not be out of place. Giemsa's solution is commonly used for staining thick smears for malaria parasites, especially in areas where the problem arises infrequently, and at least merits a mention. The study of the buffy layer is becoming a more widely used test in conditions other than those causing the L.E. phenomenon and could profitably be discussed. The danger and ubiquity of silicone in a 'coagu-

lation laboratory' needs greater emphasis. It can play havoc with tubes which are not meant to be siliconed, e.g. those used to measure coagulation time and prothrombin consumption. The recommendation to citrate the serum if there is to be delay in measuring serum prothrombin in the prothrombin consumption test is not sound; it does not always stabilize the amount of prothrombin for later testing. All these are very minor criticisms.

This inexpensive book is invaluable in any haematological laboratory and will undoubtedly be every bit as much a success as the 1st edition proved to be.

C.M.

NURSING

Gullian's Theory and Practice of Nursing. Seventh Edition. Revised by Marion E. Gould, D.N. Pp. xvi + 244. Illustrations 2. 18s. net. London: H. K. Lewis & Co. Ltd. 1956.

Contents: I. Surgical Technique. II. Food and Feeding of Patients. III. Elementary Dietetics. IV. Digestion. V. Absorption. VI. Defaecation and Examination of Stools. VII. Enemata. VIII. Artificial Feeding. IX. Lavage and Douching. X. Blood. XI. Blood-supply to the Tissues. XII. The Pulse. XIII. Respiration. XIV. Temperature. XV. Baths, Spongings, Packs. XVI. Micturition and Catheterization. XVII. Administration of Drugs. XVIII. External Local Applications. XIX. Acute Infectious or Contagious Diseases. XX. The Enteric Group. XXI. Infective Diseases of Respiratory Tract and Lungs. XXII. Acute and Chronic Heart Diseases. XXIII. Notes on Gynaecology. XXIV. Notes on Surgical Nursing. XXV. Radiotherapy. XXVI. Hints on Private Nursing. Appendix I: Weights and Measures. Appendix II: Solutions and Lotions in Common Ward Use. Appendix III: Dangerous Drugs and Poisons and Pharmacy Acts. Appendix IV: Food Tests and Digests. Appendix V: Recommended Dietary on USA and League of Nations Health Report. Appendix VI: Guide for Nurses in the Examination of Urine. Appendix VII: Abbreviations in Prescriptions. Index.

When Miss Gullian first produced her book in 1920 it was designed to summarize the instruction given to nurses in training at the Nightingale School of St. Thomas' Hospital, London. As such, the chapters were to form a base on which the nurse was required to build from the detail she obtained in her lectures and in the wards. The value of the work is obvious from the fact that it is still popular after 36 years of life and is now in its 7th edition. It has been continually revised to bring it up to date and besides routine revisions this present edition includes a new chapter on Radiotherapy.

Sister tutors will know the value of this book, and it can be recommended to all who teach nurses as a sound basis on which to build up lectures. The student nurse with initiative will also find it profitable, provided she realizes that she must use it in conjunction with her lecture and demonstration notes.

Miss Gullian has retired after long service to nursing and has made over the proceeds from royalties of this and subsequent editions to the Nightingale Fund Council.

A.H.T.

PRACTICE OF MEDICINE, BY MANY AUTHORS

The Practice of Medicine. Edited by John S. Richardson, M.V.O., M.A., M.D. (Cantab.), F.R.C.P. Pp. viii + 1075. 86 illustrations. 40s. net. London: J. & A. Churchill Ltd. 1956.

Contents: 1. The Nature of Disease—Dr. Denis Hill. 2. Antibacterial Drugs—Dr. C. M. Fletcher. 3. Diseases of the Respiratory System—Dr. C. M. Fletcher and Dr. Howard Nicholson. 4. The Cardiovascular System—Dr. Raymond Daley. 5. The Alimentary Tract—Dr. A. C. Dornhorst. 6. Disorders of the Liver and Pancreas—Dr. A. C. Dornhorst. 7. Fluid and Electrolyte Disturbances and their Correction—Dr. A. C. Dornhorst. 8. Renal Disorders—Dr. A. C. Dornhorst. 9. Diabetes Mellitus—Dr. K. O. Black. 10. Nutrition—Dr. H. E. de Wardener. 11. Storage Diseases—Dr. H. E. de Wardener. 12. The Endocrine Glands—Dr. J. S. Richardson. 13. Diseases of the Nervous System—Dr. Helen Dimsdale. 14. Psychiatry—Dr. Denis Hill. 15. Diseases of the Blood—Dr. J. L. Pininger. 16. Disorders of Pigment Metabolism—Dr. H. E. de Wardener. 17. Diseases of Bone—Dr. H. E. de Wardener. 18. Immunity and Allergy—Dr. H. J. Wallace. 19. Sarcoidosis—Dr. H. J. Wallace. 20. Collagen Diseases—Dr. H. J. Wallace. 21. The Rheumatic Diseases—Dr. J. S. Richardson. 22. The Infectious Fevers—Dr. B. D. R. Wilson. 23. Tropical Diseases—Professor A. W. Woodruff. 24. Venereal and Allied Diseases—Dr. C. S. Nicol. 25. Poisons—Dr. J. S. Richardson. 26. The Management of Terminal Disease—Dr. J. S. Richardson and Dr. Dudley Baker. Appendix. Index.

As will be seen from the list of chapter titles and contributors, this book has been written by teachers of medicine from London hospitals. They are, for the most part, engaged in the practice of general medicine as well as in a speciality, and their object has been to set out the principles which underlie the practice of medicine in a form suitable for those who will be entering general practice. In this they have succeeded and the result will be of benefit to

undergraduates and to those general practitioners who desire some extra revision-reading.

Underlying the clinical description of conditions, emphasis is placed on the various factors which may modify the pattern—social, economic, physical and mental.

While rare conditions are not overlooked, the commonly occurring disorders receive the greatest attention. The whole work has a sound practical basis, is interesting and satisfying, and there is little doubt that it will have an assured place in medical literature.

A.H.T.

ANNUAL EPIDEMIOLOGICAL AND VITAL STATISTICS

Annual Epidemiological and Vital Statistics, 1953. Pp. 572. £2 10s. Geneva: World Health Organization. Bilingual edition (French and English). Local sales agent: Van Schaik's Bookstore (Pty.) Ltd., P.O. Box 724, Pretoria. 1956.

Contents: Introduction. Part I. Vital Statistics and Causes of Death. Population. Vital Statistics. Causes of Death. Part II. Cases of and Deaths from Notifiable Diseases. Annex. Alphabetical Indexes: of countries and territories; of subjects.

WHO has just published its 6th annual volume of epidemiological vital and health statistics, a work which contains information relating to the various countries and territories of the world for the year 1953.

In this volume of more than 570 pages, 74 tables give details of the most important aspects of the health situation in all parts of the world—population composition, vital statistics, causes of death, incidence of communicable diseases and their seasonal fluctuations.

Users of this annual series are able to follow, year by year, the progress of hygiene and the evolution of the health situation in various countries. In addition to the subjects for which detailed information is usually given in all the volumes in this series—diseases of childhood, cancer and tuberculosis, for example—the present work contains hitherto unpublished data on mortality from cardiovascular diseases, a topic in which scientific circles are at present taking an ever-increasing interest.

The abundance and diversity of the data included in its pages, as well as the clearness of presentation, make this volume an inexhaustible source of information for all those who are interested in the study of what the sociologist Quételet once called 'physique sociale'.

COMPOSTING

Composting: Sanitary Disposal and Reclamation of Organic Wastes. By Harold B. Gotaas. Pp. 205, 49 figures. £1. 5s. (French edition in preparation.) Geneva: World Health Organization. 1956. Local sales agent: Van Schaik's Bookstore (Pty.) Ltd., P.O. Box 724, Pretoria.

Contents: Preface. Introduction. 1. Decomposition of organic matter. 2. Sanitary and agricultural importance. 3. Historical development. 4. Raw material: quantity and composition. 5. Fundamentals. 6. Methods and planning for cities. 7. Methods for villages and small towns. 8. Methods for individual farms. 9. Manure and night-soil digesters for methane recovery on farms and in villages. References. Index.

'Throughout most of the period of the recorded history of man some association between disease and man's waste products has been thought to exist. Since man began to plant in order to harvest needed foods, he has also associated these waste products with the fertility of the soil and the harvest'. These opening words of Dr. Gotaas's book show that the sanitary and agricultural importance of organic wastes is no new discovery; yet, as the author goes on to say, 'it is only a little more than a century since basic knowledge and a true understanding of the processes involved began to be acquired'.

While much has been written about the fertilizing value of organic wastes, few publications have at the same time dealt thoroughly with the question of the danger to public health inherent in the disposal of wastes on to the land. This book, emphasizing as it does the principles underlying the safe disposal of community wastes and relating them to the factors governing the recovery of nutrients from the soil, therefore meets a very real need. All concerned with the problems of disposal and reclamation—farmer and municipal authority alike—will find it an instructive and practical guide.

After describing briefly the processes involved in the decomposition of organic matter and summarizing the public health and economic aspects of composting, the author reviews the historical development of composting methods, from the earliest simple techniques up to the most modern mechanized processes. A short chapter on the analysis of various types of wastes comes next, followed in its turn by a long and detailed discussion of the many factors affecting the production of good compost. The author then proceeds to describe in detail the methods of composting recommended for large towns, for villages, and for individual farms, illustrating his descriptions liberally with diagrams and photographs.

Dr. Gotaas concludes his comprehensive book with an interesting chapter on the recovery of methane from the digestion of manure and night-soil. Here, after discussing the development and usefulness of methane plants, he gives details of the design and operation of some simple installations suitable for farms and villages.

EXPERT COMMITTEE ON TRACHOMA

Expert Committee on Trachoma, Second Report. No. 106. Pp. 20. 1s. 9d. Available also in French and Spanish. Geneva: World Health Organization. 1956. Local Sales Agent: Van Schaik's Bookstore (Pty.) Ltd., P.O. Box 724, Pretoria.

Contents: 1. Etiology of trachoma and laboratory research. 2. Definition, diagnosis, and differential diagnosis of trachoma and non-trachomatous follicular conjunctivitis. 3. Regional differences in the epidemiology and clinical aspects of trachoma. 4. Recent advances in the treatment of trachoma, with special reference to methods suitable for mass-treatment campaigns. 5. Criteria of cure of trachoma. 6. The planning of anti-trachoma projects and their integration in general public-health services. 7. Appraisal of control projects. 8. International coordination of research on trachoma. 9. Miscellaneous. Annex. Differential diagnosis of non-trachomatous follicular conjunctivitis.

Definite advances have been made during the last few years towards the control and eventual elimination of trachoma as a public health problem. These advances are reviewed and evaluated and guide-lines for further research are established in this report of the WHO Expert Committee on Trachoma.

To clarify previously conflicting opinions amongst specialists in different countries on the diagnosis of trachoma, the report gives a definition of the disease and sets forth the criteria of diagnosis, including differential diagnosis. An annex presents, in tabular form, the differential diagnosis of non-trachomatous follicular conjunctivitis.

Preliminary research on the local epidemiology of trachoma and associated infections is required for adequate planning of control measures. The report suggests the adoption of a standard method for epidemiological surveys and gives details of a proposed standardized plan for the collection of certain data in order to determine the trachoma index and the general pattern of disease in the community.

A scheme of treatment based on the use of antibiotic ointment, combined, when necessary, with the administration of sulfa drugs, was recommended in the first report of the Expert Committee on Trachoma, which was published nearly four years ago. The present report notes that the results of subsequent trials have fully confirmed the efficacy of this type of treatment, and that satisfactory results have also been obtained from antibiotics other than those originally recommended.

The report continues with a discussion of the criteria of cure, admitting that there is as yet no sure method of determining whether the causative agent is destroyed or merely rendered inactive. Different criteria are specified, applicable to mass campaigns and to individual cases and immigration requirements.

After devoting some space to the planning of anti-trachoma projects, the report concludes with a request for further research on the virological, bacteriological, cytobacteriological, epidemiological, and therapeutic aspects of trachoma, as well as for exchange of information and of material for laboratory studies.

FOOD HYGIENE

Food Hygiene—Fourth Report of the Expert Committee on Environmental Sanitation—Technical Report Series No. 104. Pp. 28. 1s. 9d. Available also in French and Spanish. Geneva: World Health Organization. 1956. Local Sales Agent: Van Schaik's Bookstore (Pty.) Ltd., P.O. Box 724, Pretoria.

Contents: 1. Introduction. 2. The importance of food in protecting health. 3. Principles applicable to the control of foods commonly known to have carried

disease. 4. Food-handling objectives. 5. Personnel.

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disease. 4. Problems peculiar to various areas of the world in maintaining sanitary food-handling procedures. 5. Commercial and communal feeding. 6. General objectives. 7. Technical and administrative procedures for improving conditions. 8. Personnel. 9. Suggested role for WHO in the field of food hygiene.

Ill health and human suffering resulting from the consumption of infected and contaminated food remains a public health problem of world-wide importance. The task of formulating general principles of food hygiene is undertaken in this report of a WHO Expert Committee and in addition, the problems peculiar to various areas of the world are reviewed, and guidance for the planning of food-hygiene programmes in areas at different stages of development is given.

Many foods may be the vehicle of disease, and the report discusses in some detail the control of the most important, viz., milk and milk products, meat, fish (including shellfish), and vegetables and fruits commonly eaten raw.

The problems in maintaining sanitary food-handling procedures are reviewed. This section covers such subjects as improper methods in the production of food; unsatisfactory processing procedures; and the dangers of storing, delivering, and displaying food without adequate precautions. Consideration is also given to the food-hygiene problems presented by commercial and communal feeding.

The report then turns to the planning of food-hygiene programmes, and to the technical and administrative procedures for improving conditions. In underdeveloped areas, the programmes are usually faced with problems of public inertia and apathy, with woeful sanitary conditions and practices, and with shortage of adequate means. A start, however, must be urged; and the report recommends that the first step should be the development of a trained field staff, followed by the complementary services. In rapidly developing, and in highly developed areas, the situation is usually encouraged—inertia has been overcome and poverty, ignorance, and disease are on the wane. Food hygiene programmes must keep pace with these changes; more advanced training should be given to field staff, health education of the public improved, research work developed, and higher standards set for food production and processing. Legislation should be flexible enough to keep pace with scientific and technical advances.

The report also discusses personnel requirements and outlines the training of health inspectors, on whom the bulk of the work in promoting food hygiene will fall.

PROFESSIONAL AND TECHNICAL EDUCATION

Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel—Third Report. Technical Report Series No. 109. Pp. 19. 1s. 9d. Available also in French and Spanish. Geneva: World Health Organization. 1956. Local Sales Agent: Van Schaik's Bookstore (Pty.) Ltd., P.O. Box 724, Pretoria.

Contents: 1. General. 2. Health services for which auxiliary health workers are needed. 3. Types and levels of auxiliary health workers. 4. Training of auxiliary personnel. 5. Utilization of auxiliary personnel. 6. Voluntary auxiliary health workers. 7. Nomenclatures and terminology. 8. Conclusions.

Auxiliary health workers are playing an increasingly important and responsible part within the general scheme of health services, at times being called upon to perform tasks usually entrusted to fully qualified professional personnel. What this problem means in terms of selection and training is fully discussed in the third report of the WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel.

Before examining the question of training, the report enumerates the basic health services of a community and under a classified list of professional personnel describes the type and level of auxiliary worker required.

In a discussion of training problems, useful suggestions are advanced on the selection of students and teaching personnel, location and type of institution, length of training, and curriculum content.

A commentary on the relationship of auxiliary to fully qualified professional workers offers advice on the ways and means of avoiding discord between the two types of personnel during the course of their joint work. Such questions as titles, grading, status and supervision are discussed in this connexion.

After a detailed account of assignment and conditions of service, a description is given of the kind of assistance which WHO and

other international organizations may be able to provide in the training of auxiliaries.

In recognizing the present and future importance of health auxiliaries, this report has attempted to show the need for careful selection, adequate training, suitable employment, fair remuneration, and, above all, rightful recognition of this type of worker as an indispensable member of the health team. It should be of value to all those concerned with forming a competent body of health auxiliaries.

A GERMAN X-RAY ATLAS OF BONE DISEASES

Röntgenologische Differentialdiagnose Der Knochenkrankungen. By Dr. Hans Hellner and Dr. Hanno Poppe. Pp. 903, with illustrations. DM 270. Herdweg: Georg Thieme Verlag. 1956.

Contents: Schadel. Halswirbelsäule. Brustwirbelsäule. Thorax. Obere Extremität. Lendenwirbelsäule. Becken. Oberschenkel. Unterschenkel. Allgemeine differentialdiagnostische Gesichtspunkte. Topographische Skizzen der häufigsten Knochenkrankungen. Enzyklopadie. Sachverzeichnis.

This book, which is an X-ray atlas of 903 pages, is a departure from the usual radiological book printed in Germany, in that the X-ray pictures are printed as negatives (i.e. identical to the X-ray films seen on the viewing box). This departure follows the practice customary in British and American books.

The book is extremely well written in a very lucid style. Each page has a large X-ray picture, and beneath it a short description of the essential history, symptoms, X-Ray findings and differential diagnosis.

The differential diagnosis of the most frequent and important bone-diseases is stressed.

There are about 850 X-ray pictures, taken from over 500 patients. These were selected from 75,000 X-ray reports in which the exact diagnosis was verified.

The authors stress in particular the early diagnosis of benign and malignant bone-tumours, so that by an early and exact diagnosis early treatment can be instituted.

The book is very practical. The adequate index makes it easy to find the X-ray picture of a condition. A special section is devoted to differential diagnosis.

At the end of the book are printed full-page topographical sketches of the skeleton, showing the various sites of the most frequent bone-diseases.

Inflammatory conditions, rare infective conditions and parasitic conditions are brought into the book in so far as the differential diagnosis is concerned.

This book should be translated so that English-speaking colleagues may also take advantage of it. The book has been of great interest to the reviewer, and one cannot do justice to it in a short review. The authors are to be congratulated on their production of an excellent book which should be read by all German-reading radiologists.

H.C.P.

COLLAGEN DISEASES

Collagen Diseases. By John H. Talbott, M.D. and R. Moleres Ferrandis, M.D. Pp. xv+232. 30 Illustrations + 16 Colour Plates. \$6.50. Grune & Stratton, Inc. 1956.

Contents: Preface. Colour Plates. Introduction. Systemic Lupus Erythematosus. Historical. Incidence. Relation to Other Collagen Disorders. Etiology and Pathogenesis. Pathology. Clinical Findings. Laboratory Findings. Diagnosis. Clinical Course. Treatment. Polyarteritis. Historical. Incidence. Relation to Other Collagen Disorders. Etiology and Pathogenesis. Pathology. Clinical Findings. Laboratory Findings. Diagnosis. Clinical Course. Treatment. Dermatomyositis. Historical. Incidence. Relation to Other Collagen Disorders. Neoplastic Disease and Dermatomyositis. Etiology and Pathogenesis. Pathology. Clinical Findings. Laboratory Findings. Diagnosis. Clinical Course. Treatment. Systemic Sclerosis. Historical. Incidence. Relation to Other Collagen Disorders. Etiology and Pathogenesis. Pathology. Clinical Findings. Laboratory Findings. Diagnosis. Clinical Course. Treatment. Thrombotic Thrombocytopenic Purpura. Historical. Incidence. Relation to Other Collagen Disorders. Etiology and Pathogenesis. Pathology. Clinical Findings. Laboratory Findings. Diagnosis. Clinical Course. Treatment. Bibliography. Index.

This little monograph sets out to describe some of the rarer collagen diseases. It is only in very recent times that these diseases have begun to be recognized with any degree of frequency, many clinicians even today being ignorant of their existence. While, strictly speaking, the term collagen disease includes both rheuma-

toid arthritis and rheumatic fever, the authors have omitted these from the discussion because they are well known. It is not easy to say what should have been included since the distinctions between the different conditions in the group are not always clear cut. One is a little surprised, for instance, to find thrombotic thrombocytopenic purpura included in the chosen few, but its inclusion is probably correct and is likely to be justified as knowledge increases. The other 4 conditions discussed from a compact little group.

Each condition is considered in the orthodox way. The historical background is reviewed. Then follows incidence, etiology, pathology, leading on to clinical findings, diagnosis,

course and treatment. The literature has been extensively covered, there being no fewer than 540 references, which have been chosen from a number at least 5 times as many. The handling of the subject-matter is orthodox and non-controversial. The opinions expressed are in keeping with modern thought.

So diverse is the clinical picture in this group of diseases, with so many organs and systems being involved, that clinicians will be grateful for this comprehensive cover of the subject. Here they will find the incidence of the rarer presentations of the disease as well as the more common. For this reason, more than any other, are they likely to welcome this book.

C.M.

CORRESPONDENCE : BRIEWERUBRIEK

UNEMPLOYMENT ACT

To the Editor: I presume that by now every medical practitioner has received the large poster 'Summary of the Unemployment Act' with the request to display it in our offices.

I am inclined to suggest that the Commissioner will not insist that our consulting and waiting rooms are 'offices', in the sense this word is used in South Africa, in which this poster must be displayed.

Because we mostly have but one contributor could we not receive the concession from the Commissioner to pay only every 3 months? I have since the institution of the Fund until now regularly contributed every 3 months and have never received any reprimand pointing out that this is irregular. Now it appears on this poster that the contribution must be sent every month under pain of a penalty.

I suggest that the Federal Council request the Commissioner to grant the profession the privilege of sending their cheques and return forms once every 3 months, because of the smallness of the amount. I also believe that such a system would simplify the work at the Commissioner's office.

Ordo est anima rerum

29 October 1956

AN EXPRESSION OF REGRET

To the Editor: In a circular recently issued to members of the medical profession by us on one of our products reference was made to a paper published by a member of the staff of the South African Institute for Medical Research. This paper was quoted in the circular solely because of a statement concerning the aetiological significance in asthma of certain inhalants.

We wish to make it clear that no inference can be drawn from the paper regarding our product. Regret is expressed to the author if the wording of the circular was such as to make any such inference possible.

Dr. A. Janovics
Saphar Laboratories Ltd.

Benson House
57A Long Street
Cape Town
24 October 1956

HYPNOTISM IN GENERAL PRACTICE

To the Editor: Kindly allow me to point out to Dr. Nathan Finn¹ that in my letter to the Editor published on 6 October² I did not mean that those present-day medical practitioners who associate hypnosis with the mysterious and the supernatural will be able to judge when hypnosis will benefit their patients; I was referring only to their present-day hypnosis-conscious brethren, like Dr. Finn, and also, if hypnosis and its indications are included in their curriculum, their future colleagues.

H. J. Sutherland

'Sherwood'
Woodgate Road
Plumstead
Cape
30 October 1956

1. Finn, N. (1956): S. Afr. Med. J., 30, 1048 (27 October).
2. Sutherland, H. J. (1956): *Ibid.*, 30, 976.

THE WORK OF THE OPTOMETRIST

To the Editor: While acknowledging that the views expressed in the *Journal* do not necessarily reflect those of the Medical Association, I was nevertheless amazed to see an article¹—not a letter, mark you, but an 'original article'—written by a layman in your issue of 20 October. The contents of the 'article' are provocative and critical, and call for a reply from responsible authority. As a humble practising ophthalmic surgeon, I would like to give my personal opinion on what I consider the duties of the ophthalmologist are.

Our standpoint has always been that in the best interests of the patient, which is the factor that concerns us most, the responsibility for any examination of the eyes should be on the medical practitioner. In addition to having access to all the resources of the skilled optician, the doctor can bring to bear the whole of his medical training and experience, either in deciding that it is possible to determine the absence of disease, or on the other hand to recognize and to treat any diseased condition that may be present. One cannot divorce examination and treatment of eye defects from medical and surgical practice. This point of view has been endorsed by the British Medical Association in their evidence to the Departmental Committee on the Optical Practitioners (Registration) Bill in Great Britain. It would be interesting to know what the view of the South African Medical Association is. The Ophthalmological Society of South Africa has communicated to the Federal Council in no uncertain manner what it feels is best in the interests of the patient.

Our view is that refraction is part of the routine diagnostic examination of the eye. The eye is not a separate optical instrument, but a living and inseparable portion of the human body, and shares in its diseases. It is true that in many cases the correction of an error of refraction is a relatively easy procedure. It is not however as simple as it seems because the symptoms which errors of refraction give rise to may well be the symptoms of grave underlying disease, the recognition of which is too great a responsibility to place upon a trained technician skilled only in a small and limited field. Not only are defects of vision frequently connected with conditions of local and general disease, but general health is frequently affected by ocular conditions. The meaning and nature of these in each case can only be determined by persons who have received a medical and surgical training.

No medical practitioner would even consider for one moment Mr. Coates's suggestion to improve clinic practice by allowing the optician to interview and screen all cases, whether pathological or not. What qualifications has any optician got that he should be put in a position of such responsibility—to decide on the disposal of the patients? The idea is quite fantastic, and has no counterpart anywhere else in medical practice or in clinics anywhere in the world. Mr. Coates hints that the optician would be able, by reason of his basic qualifications, to diagnose which cases are pathological and which are not. The only basic qualifications for being able to decide this is the medical degree, obtainable after 6 years of study at one of the universities.

The other fantastic suggestion is that the optician should do certain work on pathological cases delegated to him by the ophthalmologist, such as refraction, fields, colour vision etc. A visual-field investigation demands a sound working knowledge of neuro-ophthalmology, in order to know what to look for.

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As it is a subjective test it cannot be put in the same category as blood counts or other laboratory tests. Mr. Coates wants it both ways; the optician is to see the cases first and decide on their disposal, but in case the ophthalmologist sees the cases first he will still be able to assist the ophthalmologist.

I cannot see how, if legislation were brought in to do away with the travelling quacks, this would increase the diagnostic ability of the qualified optician. By a magic sweep of the wand, overnight the opticians would become able to diagnose the early stages of disease, according to Mr. Coates. Most ophthalmologists have had experience of the harm wrought by fully qualified opticians who believe that they have a certain knowledge of medicine, and have treated eye conditions on their own, though they have had no medical training. I can quote two cases of my own seen in the last year, where actual harm has been done, but where no further action could be taken because the patients were unwilling to involve themselves in litigation. Another example is the great number of young workers who complain of symptoms of eye-strain or of headaches. Often very small errors of refraction are found, errors which will be found in the majority of the population. To the doctor these cases call for wider investigation and treatment. To the optician these cases call for spectacles. None of the training of opticians, whether it be the 2-year part-time course or the 3-year full-time course, provides anything in the way of general medical training, or of specialized medical training pertaining to the eye, which is comparable in any way to the training required of a medical practitioner.

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26 October 1956

1. Coates, W. R. (1956): S. Afr. Med. J., 30, 1018 (20 October).

'MEDICAL REPRESENTATIVES'

To the Editor: May I be permitted to congratulate Dr. Frank Proksch* on his letter published in the *Journal* of 20 October 1956.

I am pleased to have raised this theme and that my words, to which exception was taken in letters by 'representatives' and even some colleagues, have at last brought forward this strong expression of the sentiments which many of us hold, who object to the wasting of time by many of the uninvited visitors to our rooms.

As to the point that the 'representative' has to make a living—which also applies to the medical practitioner—many of them are actually qualified chemists, and could do much better work in the chemist's shop. Nevertheless, if we object to the idea 'an expert . . . to advise the physician' we must of course object in stronger terms if the idea is practised behind the counter—to be 'an expert to advise the patient' or to pass opinions on the merit of the prescription presented for dispensing! I am often told by people that the chemist passed a favourable opinion on my prescription!

In former days it was the prescription of a famous teacher which we treasured and which the chemists manufactured. These days it seems that the chemist compiles the medicine and advises the physician on its therapeutic properties. I am not aware that the curriculum of a chemist includes clinical medicine and therapeutics.

Physician

24 October 1956

1. Proksch, F. (1956): S. Afr. Med. J., 30, 1023 (20 October).

CEREBRAL ANOXIA FOLLOWING ANAESTHESIA

To the Editor: Hypoxia is probably the most important physiological trespass that can be committed in anaesthesia, and therefore, discussion on this subject is always timely, as in Dr. Frances Ames's paper on this subject (*Journal*, 20 October 1956, vol. 30, 1013). However, there are debatable points in what she has written.

It would, for instance, be interesting to learn what justification there is for stating that 'anaesthesia itself produces a degree of

histotoxic anoxia'. This may be true of chloroform and deep ether anaesthesia, but hardly as a generalization. Investigation of the depression of tissue respiratory enzymes by narcotics seems to show that an appreciable interference is only produced by relatively high concentrations; certainly higher than those producing sedation or light anaesthetic sleep (Butler, 1950). Whether the depression that can be so demonstrated is of significance is also open to doubt in the light of accumulating knowledge of the many alternative metabolic pathways that are available in the production and utilization of energy (Wood, 1955). Again, it might be anticipated that any enzyme system as important to cell function as respiration might have considerable functional reserve, perhaps on a par with neurone cholinesterase systems, which may be depressed to below 10% of their normal activity before showing any interference with cell function (Nachmansohn, 1948).

More convincing seem to be the findings that anaesthetics, at least in their lower effective concentrations, produce a synaptic block before signs suggestive of histotoxic depression appear (Larabee and Posternak, 1952). This idea was, indeed, foreshadowed by Brooks and Eccles (1947), whose evidence suggested that anaesthetics might stabilize the polarization of the post-synaptic membrane, whereas anoxia produces depolarization.

In discussing the 'notorious reputation of nitrous oxide', Dr. Ames appears to attempt the revival of a fallacy recently demolished in the correspondence columns of the *Lancet*, when an editorial statement (*Lancet*, 1955) that 'nitrous oxide itself may have very serious effects on the nervous system' was heavily criticized by informed opinion. It would appear to be widely recognized that any untoward effects are almost certainly due to hypoxia alone, and are thus avoidable, which was the view of one of the authorities quoted by Dr. Ames (Courville, 1939). Only as an asphyxiant may nitrous oxide possess a notorious reputation, a reputation which possibly arose in early days when inaccurate machines were set deliberately to deliver hypoxic gas-oxygen mixtures.

Used purely as an anaesthetic, nitrous oxide cannot (without adjuvants) produce deep anaesthesia, and is certainly safe for the prolonged anaesthesia which can be maintained with an abundance of oxygen (Gray, 1954). One had hoped that recent methods of treating paralytic poliomyelitis and tetanus with relaxants and nitrous oxide might have afforded convincing evidence of the lack of harmful effects on the central nervous system—at least of the gas.

To state that a "bloodless field" . . . is also an anoxic field' is hardly a justifiable generalization. To a considerable extent the decreased organ-flow occasioned by hypotensive techniques may be compensated for by an increased oxygen-yield from the blood (Hughes, 1955)—and the oxygen reserve of even venous blood may normally be relatively large. Whether it is the author's intention to suggest in this paragraph that relaxants regularly produce hypotension is not clear. It is a concept that perhaps runs contrary to general opinion; there is even evidence that relaxants may protect against hypotensive episodes during anaesthesia (Burstein *et al.*, 1950).

The case reported by Dr. Ames is of interest in that such severe mental damage is not commonly seen to follow what was apparently a good recovery of consciousness 8 hours after operation. It would be of value to know whether an antagonist was given to reverse the action of the fairly large dose of gallamine, or whether the immediate post-operative restlessness was a manifestation of post-operative hypoxia. One may also speculate on how much cerebral damage was contributed by the heavy post-operative medication further depressing a respiratory centre already damaged by hypoxia. Maybe this patient's misfortune was really cerebral anoxia following anaesthesia.

It is unfortunate that no evidence is offered that might exclude other causes of this man's condition, such as a virus encephalitis, or even a recent head-injury, which apparently might have been possible in this particular patient. Or his early post-operative state would not have been inconsistent with an acute organic (drug-induced) psychosis (Hoch, Pennes and Catell, 1953). This might later have merged into a nutritional encephalopathy of the type that may occur in hyperpyruvaemic states (Sinclair, 1956), since the brain's requirements of 'stress vitamins' may be greatly increased by hypoxia and depressant drugs (Allison,

1952). These last two factors probably did contribute to the clinical picture presented in the days after operation; may this not indicate ways of improving treatment of the condition?

However, none of these suggestions offered should be allowed to detract from the importance of the main subject. To avoid cerebral anoxia must be a prime consideration of all who use anaesthesia, for the danger is always present in many guises, and the end-results so distressing that one might even prefer the death of a patient to the destruction of his intelligence.

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30 October 1956

- Allison, R. S. (1952): *Brit. Med. J.*, **2**, 1286.
Brooks, C. McC. and Eccles, J. C. (1947): *J. Neurophysiol.*, **10**, 349.
Butler, T. C. (1950): *Pharmacol. Rev.*, **2**, 121.
Burstein, C. L., Jackson, A., Bishop, H. F. and Rovenstine, E. A. (1950): *Anesthesiology*, **11**, 409.
Courville, C. B. (1939): *Untoward effects of nitrous oxide anaesthesia*, 1st ed., p. 22. California: Pacific Press Publishing Association.
Gray, T. C. (1954): *Ann. Roy. Coll. Surg. Engl.*, **15**, 402.
Hoch, P. H., Pennes, H. H. and Cattell, J. P. (1953): *Res. Publ. Assoc. Nerv. Ment. Dis.*, **32**, 287.
Hughes, G. (1955): *Brit. J. Anaesth.*, **27**, 229.
Larrabee, M. G. and Posternak, J. M. (1952): *J. Neurophysiol.*, **15**, 91.
Nachmansohn, D. (1948): *Bull. Johns Hopk. Hosp.*, **83**, 463.
Sinclair, H. M. (1956): *Brit. Med. Bull.*, **12**, 18.
Wood, H. G. (1955): *Physiol. Rev.*, **35**, 841.

THE NUMBER OF DOCTORS IN SOUTH AFRICA

To the Editor: Many of us have for a long time been perturbed by the 'Rush into Medicine' which this country has witnessed since the War. I, together with many colleagues, feel that the supply of doctors in this country exceeds the demand and will continue to do so for quite a few years to come. From time to time we have been warned that this continuing trend will eventually mean the economic ruin of the medical profession in this country. As more and more graduates swell the ranks of our profession, it is quite obvious that the average income of the doctor must decrease. Doctors are a national necessity, but they are also an economic liability, i.e. it requires a certain amount of wealth to provide a doctor with a reasonable income. In days gone by private practice provided a reasonably remunerative field, but the ever-increasing cost of illness has been responsible for the growth of contract practice, where the remuneration is lower than it would be for an equal amount of work in purely private practice. There is such keen competition for the contract-practice posts that they can often be filled at whatever salary is offered. Sheer economic necessity forces some of us to undersell our services since there are numerous applicants competing for almost every appointment.

The Medical Association has been attempting to have various fees increased; they have argued that, compared with other services, there has been no commensurate increase in doctor's fees. While one agrees that doctors should be adequately remunerated for their services, in my opinion the root cause of the low fees offered is the fact that there are in this country at present so many doctors struggling to make a living that they are in some cases forced to accept underpaid appointments to supplement their incomes or to make ends meet. This state of affairs will become aggravated as the number of doctors continues to increase. I think it would have been far more to the point if our Association, instead of arguing about fees, had turned its attention to the prevention of this overcrowding in the profession. The public and the authorities should be informed that the medical profession is overcrowded, and energetic measures should be taken to remedy this state of affairs, or at least to prevent it from becoming worse. It should be possible to regulate the supply of doctors to meet, and not to exceed, the demand.

In his speech at the opening of the Karl Bremer Hospital, as

reported in our *Journal*, the then Minister of Health said that there were at present not enough interns available to fill the existing posts, and that it was therefore necessary to increase the number of graduates. This, presumably, is the reason for the establishment of the Medical Faculty of the Stellenbosch University. The Minister, however, did not say what was to happen to these young men and women after they have completed their internships. Where are the openings for all these graduates once they have done their hospital year?

In our *Journal* of 29 September Dr. J. H. Struthers¹ in 'Impressions of a Presidential Year' touches on this question of over-production and says: 'This now links up with a problem which has concerned both the profession and the Federal Council of our Association and that is the question of over-production both of doctors and specialists. New medical schools have been established without perhaps very much reference to, or investigation of, the requirements of South Africa as far as doctors are concerned . . .'

My question is: What has the Association done, or what is it doing, about this state of affairs? Devising blue-prints for health insurance and arguing about medical fees will not solve the basic problem. In our *Journal* of 6 October, a meeting of the South African Medical and Dental Council is reported in which Prof. J. F. Oosthuizen² also dealt with this matter and said *inter alia* that economically it was doubtful whether the country could absorb a similar increase in the future.

I think I am correct in saying that the education of a doctor costs the State more than it costs the student, and thus the State must of necessity have a big say in the training and production of doctors, as well as the establishment of medical schools. With the continuing over-production of doctors the day is not far distant when we shall all be recruited into a full-time State medical service, as this will be the only way in which the State will be able to discharge its obligations to the doctors whose training it financed. No, at the present rate of increase the country cannot absorb many more doctors economically, but a State medical service would and could absorb them. Whether such a medical service would or would not be a desirable development is a matter of opinion, but unless the indiscriminate rush into medicine can be halted it must surely come.

The medical profession as a whole is not, I think, aware of this serious state of affairs, and collectively we have so far done little or nothing to point these things out to the public and the authorities. It is high time we all sat up and considered this matter very carefully. May I finally request the following figures if available?

The total number of doctors in the Union and S.W. Africa.
The number of general practitioners in the Union and S.W. Africa.

The number of specialists in the Union and S.W. Africa.
The number of GPs in private practice.
The number of specialists in private practice.
The number of GPs in institutional practice.
The number of specialists in institutional practice.

The expected number of doctors in the Union and S.W. Africa in 1960? I am sure that these figures will prove illuminating to us all, and their careful perusal should enable us to realise the gravity of the situation.

Observer

25 October 1956

1. Struthers, J. H. (1956): *S. Afr. Med. J.*, **30**, 946.
2. Report (1956): *Ibid.*, **30**, 968.

[At the meeting of the South African Medical and Dental Council held on 19 March 1956 the Registrar reported that the medical practitioners on the register at 31 December 1956 numbered 6,987 (of whom 1,242 were registered as specialists), the interns 446 and the medical students 1,176 (see this *Journal* of 7 April 1956, vol. **30**, p. 346; similar information was published in the *Journal* for previous years). At the meeting of the Council held on 17 September 1956 the President (Prof. S. F. Oosthuizen) stated that at 30 June 1956 the register comprised 7,348 medical practitioners and 318 interns, whereas the number of medical practitioners on the register in 1932 was 2,528, and that the number of medical students on the register was 564 in 1932, 2,270 in 1948, and 1,422 in 1955 (see this *Journal* of 6 October 1956, vol. **30**, pp. 968 and 969). The other figures our correspondent asks for are not available without research. *Editor.*]